IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

March 6, 2016
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

December 10, 2018

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ACRONYM	DESCRIPTIONS
AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
PST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration

nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On March 6, 2016, State and Local Ambient Air Monitoring Stations (SLAMS), located in Brawley (AQS Site Code 060250007) and Westmorland (AQS Site Code 060254003), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentrations of 237 $\mu g/m^3$ and 220 $\mu g/m^3$ (**Table 1-1**). PM_{10} 24-hr measurements above 150 $\mu g/m^3$ are exceedances of the NAAQS. The SLAMS in Brawley and Westmorland were the only stations in Imperial County to measure exceedances of the PM_{10} NAAQS on March 6, 2016.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON MARCH 6, 2016

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION $\mu g/m^3$	PM_{10} NAAQS $\mu g/m^3$
3/6/2016	**Brawley**	**06-025-0007**	**3**	**24**	**237**	**150**
3/6/2016	**Westmorland**	**06-025-4003**	**3**	**24**	**220**	**150**
3/6/2016	Calexico	06-025-0005	3	20	64	150
3/6/2016	El Centro	06-025-1003	4	24	86	150
3/6/2016	Niland	06-025-4004	3	21	124	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On March 6, 2016, the Brawley and Westmorland monitors were impacted by elevated particulate matter caused by the transport of fugitive windblown dust from gusty high winds associated with a large low-pressure system and accompanying cold front moving through the area.[2]

This report demonstrates that a naturally occurring event caused an exceedance observed on March 6, 2016, which elevated particulate matter and affected air quality. The report provides

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2016, Pacific Daylight Time (PDT) is March 13 through November 6. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

[2] Area Forecast Discussion National Weather Service San Diego CA 842 AM PST Sunday, March 6, 2016

concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedance would not have occurred without the transport of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude the PM_{10} 24-hour NAAQS exceedance of 237 µg/m^3 and 220 µg/m^3 (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[3].

I.1 Demonstration Contents

Section II - Describes the March 6, 2016 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley and Westmorland stations this section discusses and establishes how the March 6, 2016 event affected air quality such that a clear causal relationship is demonstrated between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in local conditions and standard conditions. PM_{10} continuous data prior to 2013 is in local condition measurements, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the March 6, 2016 event and its resulting emissions defining the event as a “natural event”.[4]

Section IV - Provides evidence that the event of March 6, 2016 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

[3] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

[4] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD and the National Weather Service (NWS) provided an extended week to weekend notification via the ICAPCD's webpage on March 5, 2016 that a cold front would pass through the region by Sunday, March 6, 2016. The San Diego and Phoenix NWS weather stories and the ICAPCD web notification advised of the possibility of strong and gusty winds through the mountains and desert regions through the weekend, with the potential for elevated particulate matter due to blowing dust. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day advisory for Imperial County on March 6, 2016. **Appendix A** contains copies of notices pertinent to the March 6, 2016 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM_{10} concentrations from the Brawley and Westmorland monitors on April 17, 2017. The INPEE, for the March 6, 2016 event, was formally submitted by the CARB to USEPA Region 9 on April 24, 2017. Subsequently there after a second revised request was sent to CARB requesting preliminary flags on additional days for 2016. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County on March 6, 2016. The submitted request included a brief description of the meteorological conditions for March 6, 2016 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on January 10, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 237 µg/m^3 and 220 µg/m^3, which occurred on March 6, 2016 in Brawley and Westmorland. The final closing date for comments was February 12, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the March 6, 2016 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR §50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on March 6, 2016, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

- a The event created the meteorological conditions that entrained emissions and caused the exceedance.
- b The event clearly “affects air quality” such that there is the existence of a clear causal relationship between the event and the exceedance.
- c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
- d The event “is not reasonably controllable and not reasonably preventable.”
- e The event is “caused by human activity that is unlikely to recur at a particular location or [is] a natural event.”
- f The event is a “natural event” where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley and Westmorland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II March 6, 2016 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the March 6, 2016 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1**). The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center, the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion, which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2**). In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6**). Together, the incorporated cities, including Niland and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter) mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that affect Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

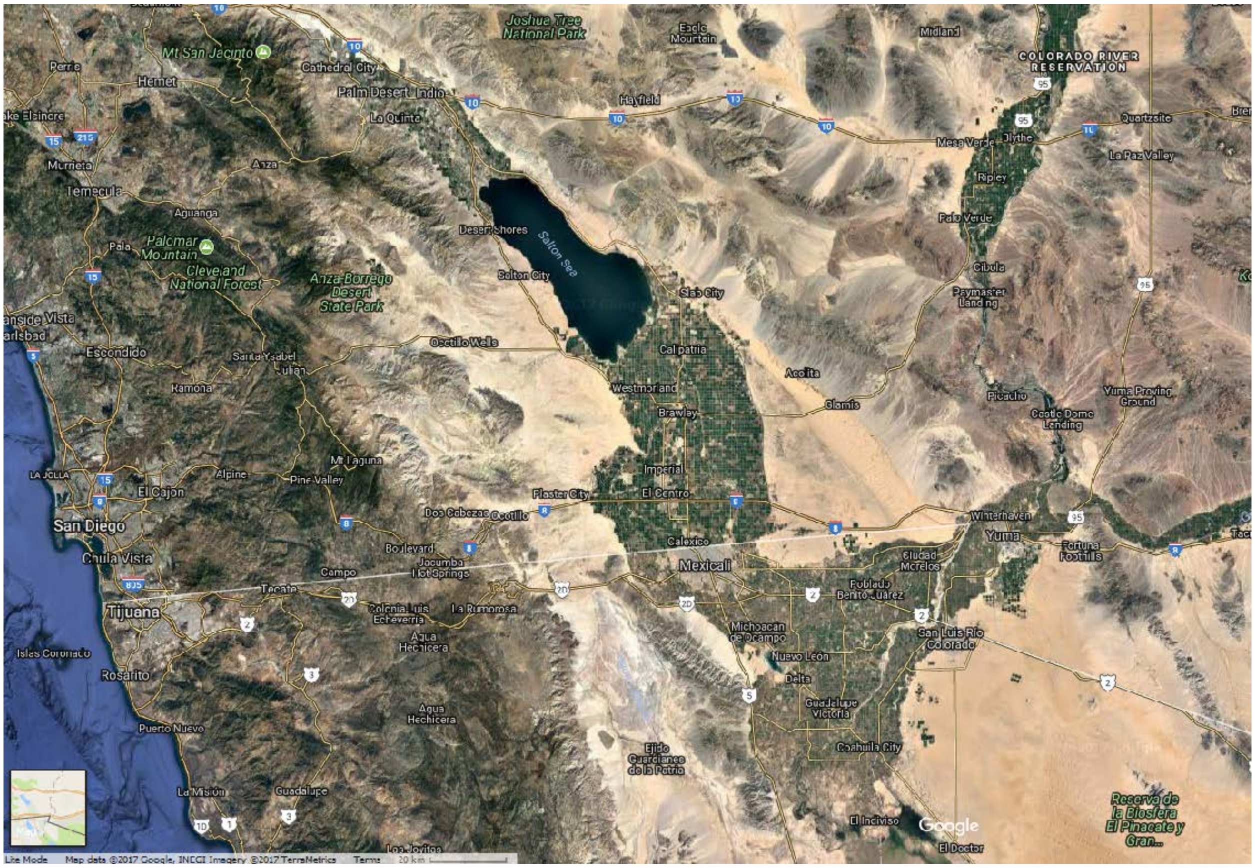


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. SLAMS in Imperial County are located in Calexico, El Centro, Westmorland, Brawley, and Niland. Each station measures air quality and meteorological data; the station located in Brawley only measures air quality and no meteorological data. Other air monitoring stations with air quality and meteorological data used for this demonstration include stations in Riverside County and Arizona (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on March 6, 2016, occurred at the Brawley and Westmorland stations. The Brawley and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on March 6, 2016, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8**).

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

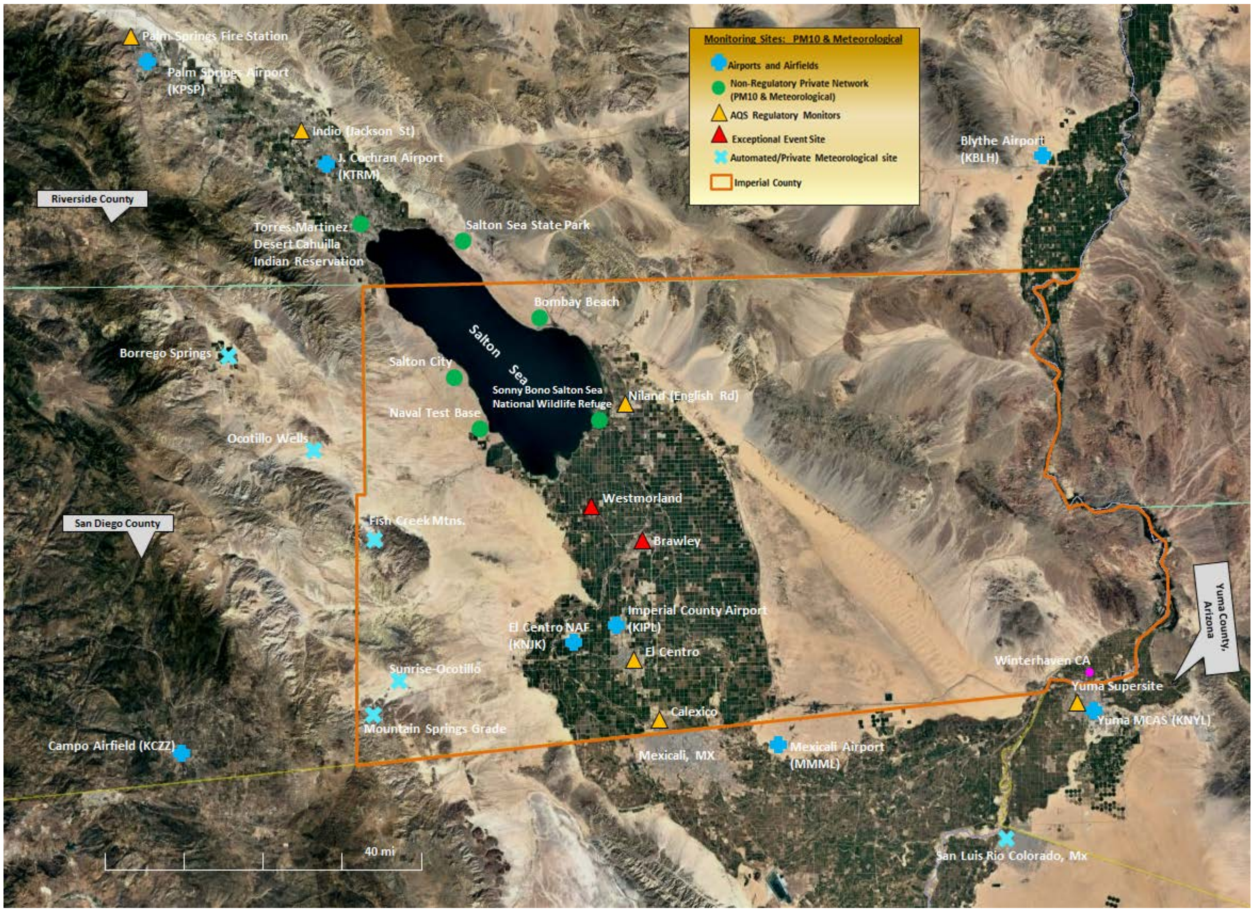


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support of an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These stations are privately owned and non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

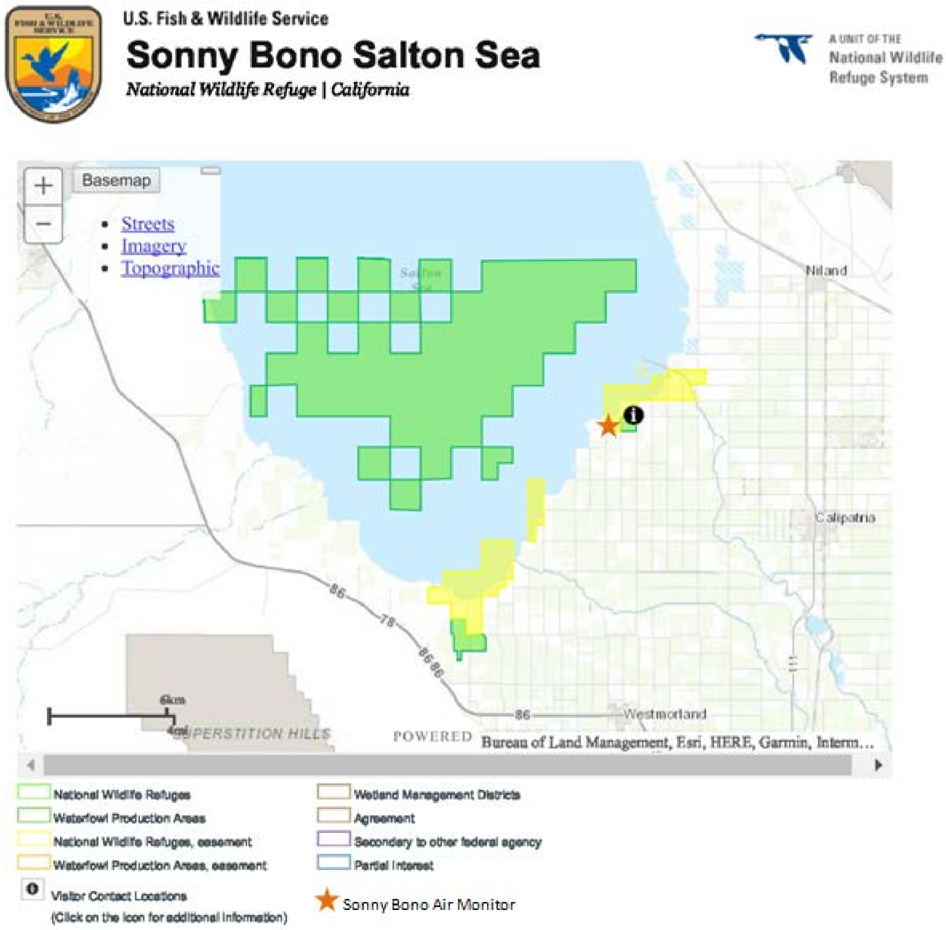


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
MARCH 6, 2016

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} ($\mu g/m^3$) Avg	1-hr PM_{10} ($\mu g/m^3$) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13 701	-15	-	-	-	-	-
		BAM 1020					237	995	1300		
Calexico-Ethel Street	CARB	BAM 1020	06-025-0005	(81102)	13698	3	64	448	0600	21.3	1400
El Centro-9th Street	ICAPCD	BAM 1020	06-025-1003	(81102)	13694	9	86	505	1200	21.3	1200
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	-	-	-	23.6	1600
		BAM 1020					124	526	1700		
Westmorland	ICAPCD	BAM 1020	06-025-4003	(81102)	13697	-43	220	995	1200	21.9	1300
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	22	87	1600	11	0700
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	92	446	1100	15	1000
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	193.3	985	1500	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

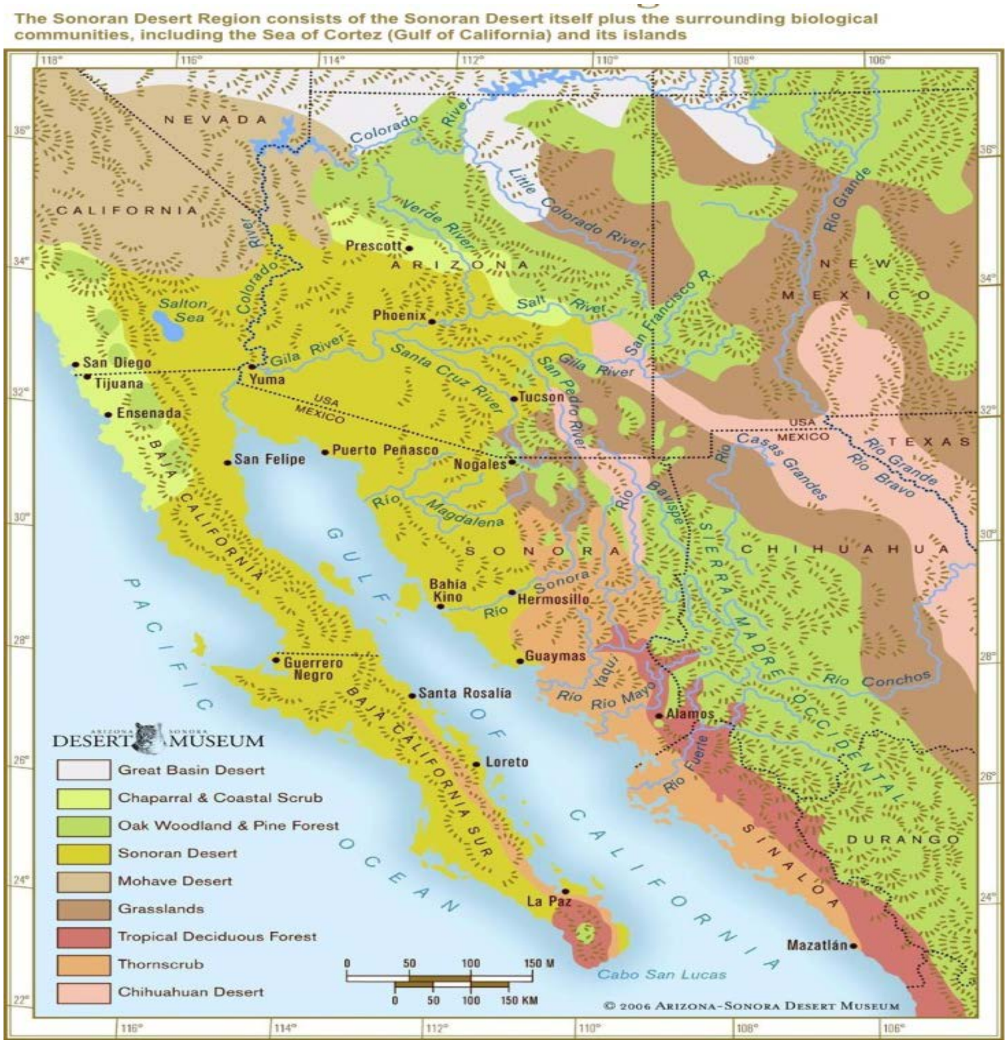


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 2.64” (**Figure 2-16**). During the 12-month period prior to March 6, 2016 Imperial County measured total annual precipitation of only 1.62 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

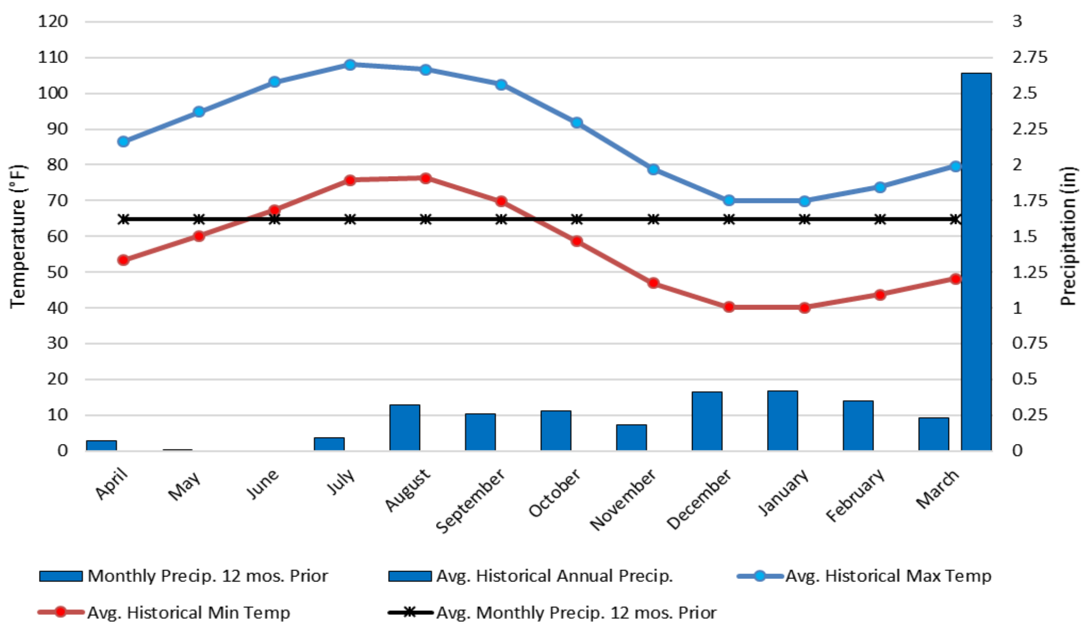


Fig 2-16: Historical Imperial County weather. Prior to March 6, 2016, the region suffered abnormally low total precipitation of 1.62 inches. Average annual precipitation is 2.64 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[5] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for March 6, 2018 caused when a strong Pacific low-pressure system with preceding gusty westerly winds blew across southern California and into Imperial County. A long frontal zone associated with the low-pressure system extended from the southern Sierra Nevada Mountains southwest through the Los Angeles basin and farther offshore. As the system moved inland over southern California, it brought high winds to a wide region. Tight surface pressure gradients developed from the southern California coastline to southern Nevada. This led to powerful winds across southeastern California and into southwestern Arizona.

Figures 2-17 through 2-19 provide information regarding the meteorological conditions that created conditions conducive to high winds across southeastern California and Imperial County. These images combined summarize the information regarding the timing, speed and direction of the winds.

[5] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

FIGURE 2-17
TIGHTENING SURFACE PRESSURE GRADIENTS

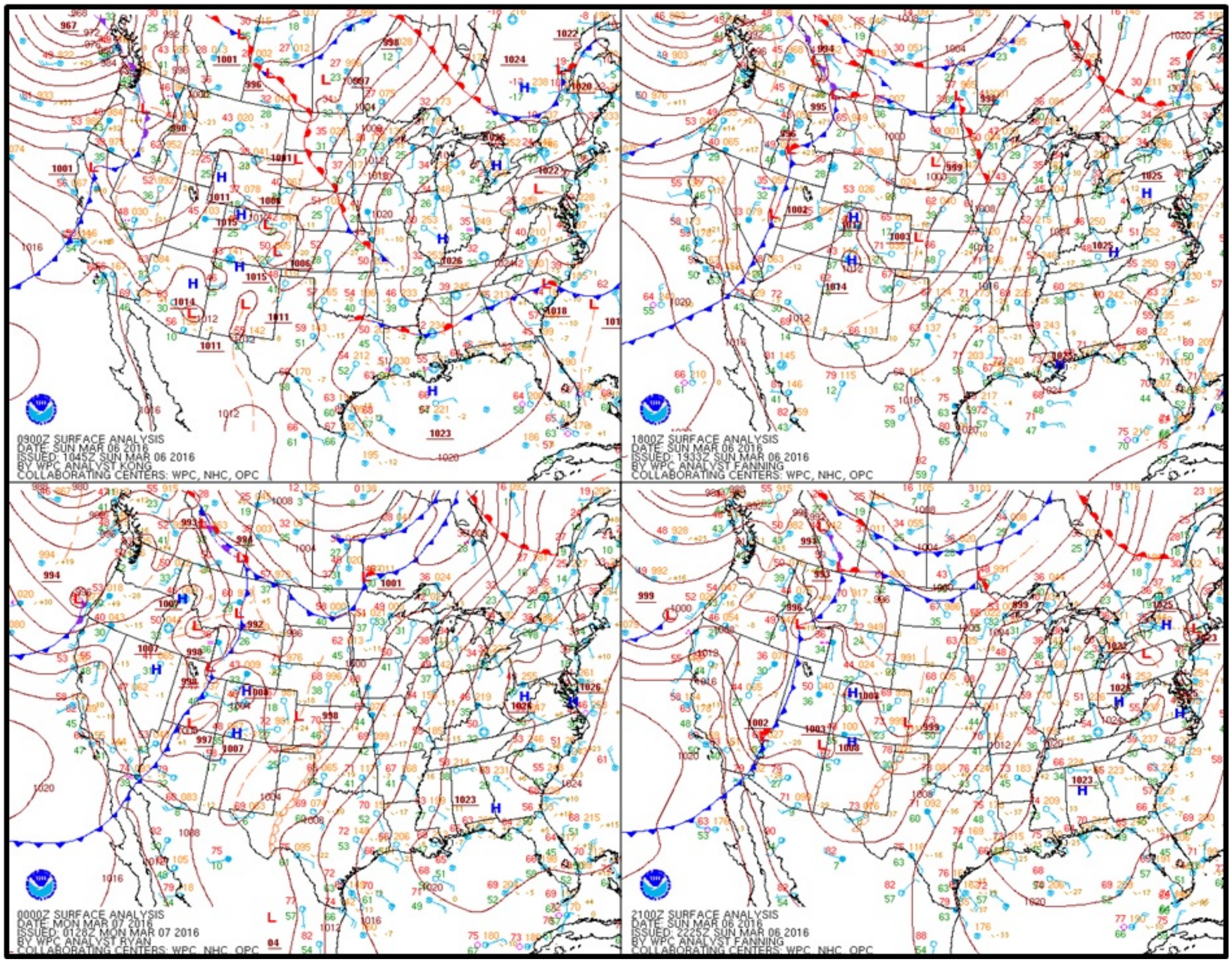


Fig 2-17: A quad of Surface Analysis images that show the tightening of the pressure gradient during March 6. The long cold front accompanying the system is also seen stretching down from the Idaho-Nevada border southwest through Arizona and California. The tightening gradients were responsible for the high gusty winds that blew through Imperial County. Surface analysis maps show the tightening of the surface gradient March 6, 2016. Clockwise, from top left: 0100 PST; 1000 PST; 1300 PST; 1600 PST. Source: Weather Prediction Center Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php

FIGURE 2-18
GOES-W INFRARED SATELLITE IMAGE WITH WIND BARBS

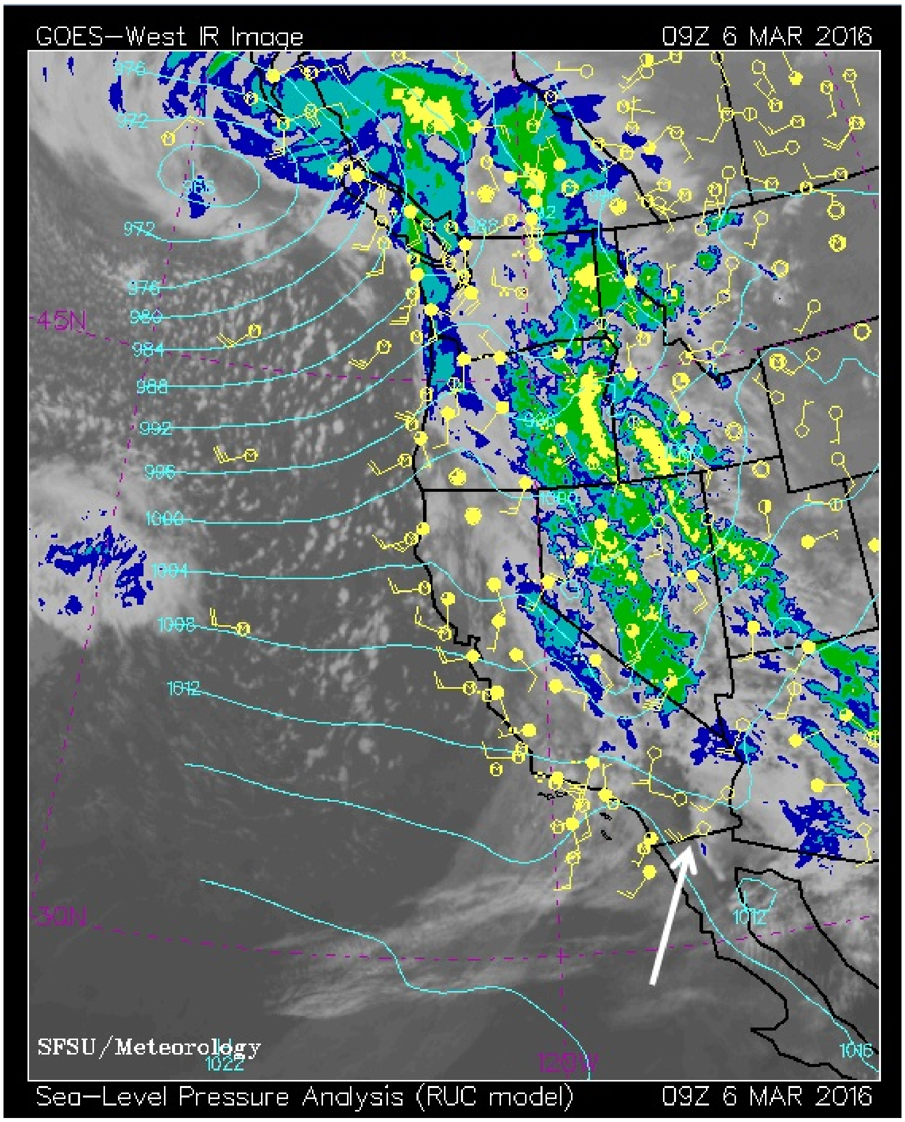


Fig 2-18: A GOES-W infrared satellite image overlaid with wind barbs depicting westerly winds of at least 28.8 mph at 0100 PST on March 6. At 0053 PST, Imperial County Airport (KIPL) measured winds of 28 mph with gusts of 36 mph. Winds continued to increase during the day. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

FIGURE 2-19
GOES-W VISIBLE SATELLITE IMAGE WITH WIND BARBS

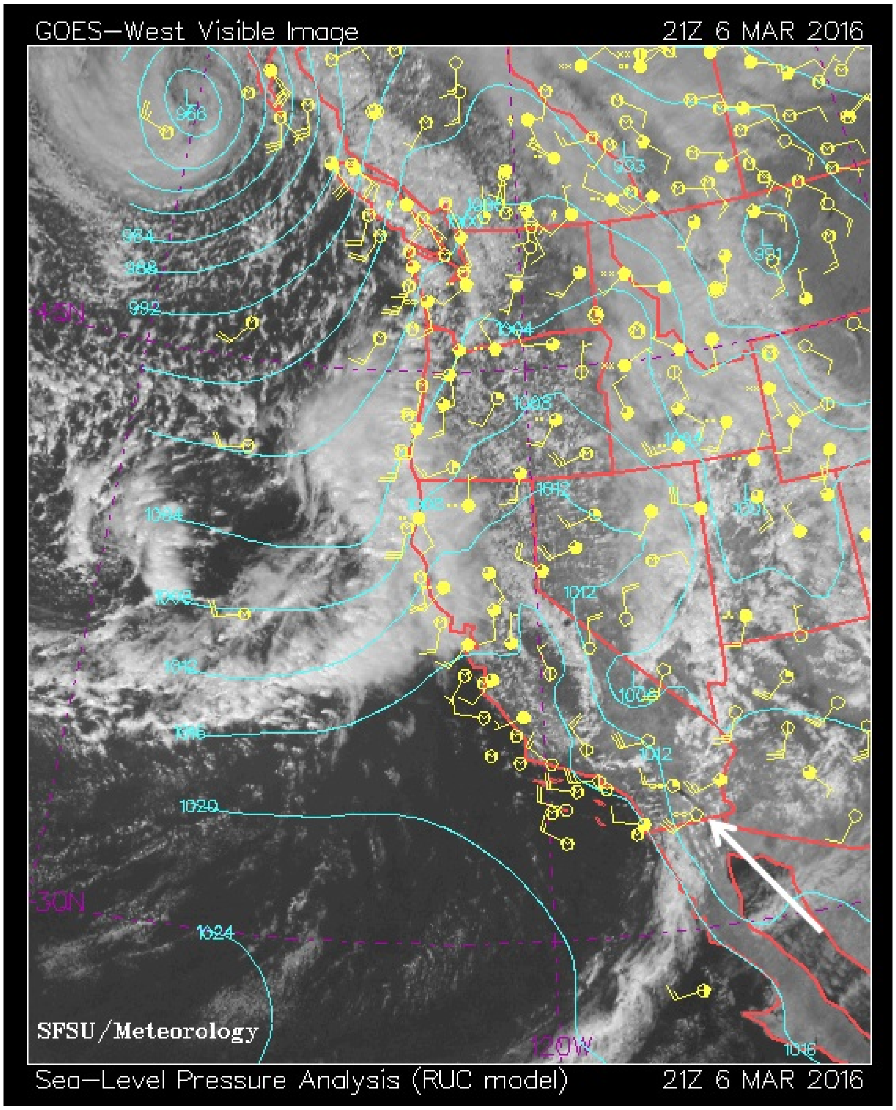


Fig 2-19: A GOES-W visible satellite image (1300 PST) overlaid with wind barbs depicting westerly winds measuring at least 34.6 mph along with the symbol for haze. At 1256 PST El Centro NAF (KNJK) measured winds of 30 mph with gusts of 39 mph. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

Figure 2-20 depicts the overall ramp up leading to the exceedance during the wind event of March 6, 2016. Winds and gusts immediately increased on March 6, 2016. At 0053 PST, Imperial County Airport (KIPL) measured winds of 28 mph with gusts of 36 mph. By 0456 PST winds at El Centro NAF (KNJK) measured 32 mph and gusts were 39 mph. Windblown dust affected both the Brawley and Westmorland monitors. By 1200, the Westmorland monitor measured a PM_{10} concentration of 995 µg/m^3. An hour later Brawley's monitor measured a concentration of 995 µg/m^3.

FIGURE 2-20
RAMP UP ANALYSIS MARCH 6, 2016

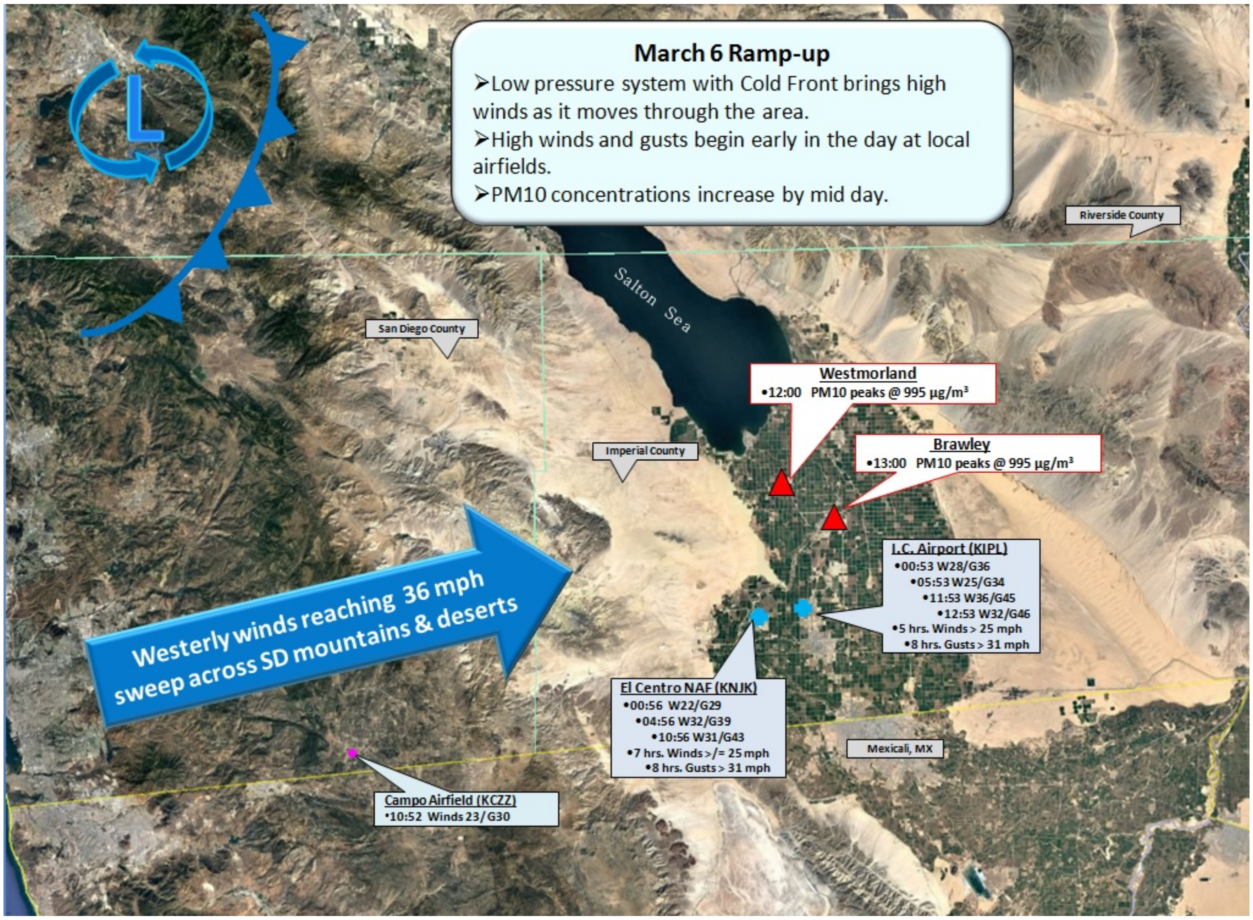


Fig 2-20: A low pressure and cold front swept through the region bringing strong gusty winds. Winds and gusts continued to remain strong (with brief periodic reductions) through the mid-afternoon of March 6, 2016. The Brawley and Westmorland monitors affected by windblown dust transported by gusty high winds measured an exceedance. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON MARCH 6, 2016

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed Brly	Nlnd	Wstmd
IMPERIAL COUNTY								
Imperial Airport (KIPL)	36	250	1153	46	1243	96	13	213
Naval Air Facility (KNJK)	32	250	456	43	1056	6	98	57
Calexico (Ethel St)	21.3	289	1400	-	-	470	-	470
El Centro (9th Street)	21.3	260	1200	-	-	843	-	995
Niland (English Rd)	24.7	259	1400	-	-	470	-	470
Westmorland	21.9	286	1300	-	-	995	-	995
RIVERSIDE COUNTY								
Blythe Airport (KBLH)	32	250	1452	38	1452	470	-	470
Palm Springs Airport (KPSP)	25	320	1050	37	1653	391	11	130
Jacqueline Cochran Regional Airport (KTRM) - Thermal	31	280	1115	44	1115	96	13	213
ARIZONA - YUMA								
Yuma MCAS (KNYL)	30	290	1532	43	1532	303	273	352
MEXICALI - MEXICO								
Mexicali Int. Airport (MXL)	31	270	1510	-	-	303	273	352

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory model,[6] depicted in **Figure 2-21**, indicates the path of the airflow 12 hours prior to the Brawley (green icon) and Westmorland (blue icon) monitors measuring peak hourly PM_{10} concentrations.

The trajectory illustrates the path of air as it approached the Brawley and Westmorland monitors from the west-southwest 12 hours before affecting the monitors. Windblown dust transported by strong gusty westerly winds originating from the San Diego Mountains, over natural open deserts and agricultural lands to the west of Imperial County affected PM_{10} monitors throughout southeastern California and Arizona. The back-trajectory ends at 1200 PST coincident with the measured peak concentration of 995 µg/m^3 at the Westmorland monitor and an hour before the Brawley monitor measured a similar peak concentration. It should be noted that modeled winds can differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of

[6] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

12 km and is integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

FIGURES 2-21
HYSPLIT MODEL MARCH 6, 2016

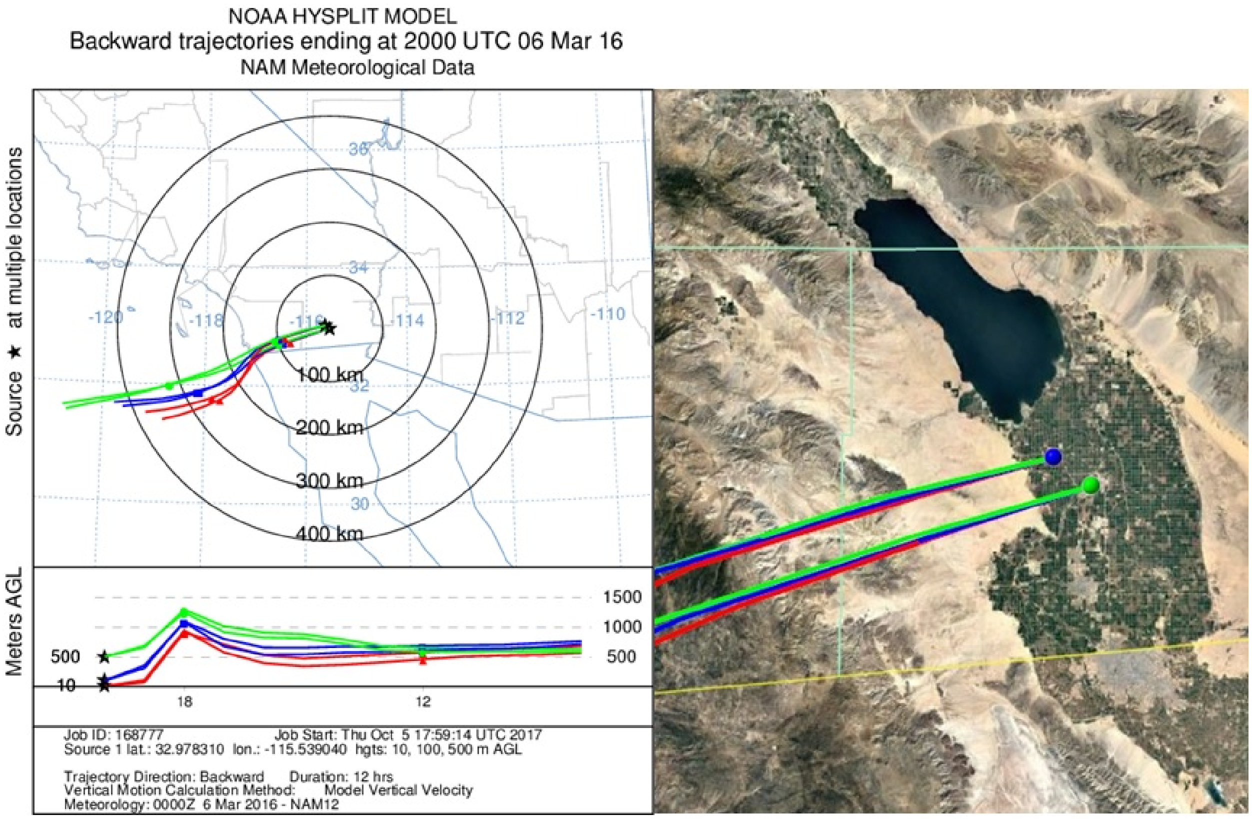


Fig 2-21: A 12-hour back trajectory ending at 1200 PST. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figures 2-22 and 2-23 illustrate the wind speeds and elevated levels of hourly PM_{10} concentrations measured in Riverside, San Diego, Imperial and Yuma counties March 5, 2016 through March 7, 2016. All sites show a correlation between the elevated wind speeds and elevated PM_{10} concentrations. Elevated winds at airports increased during the morning of March 6, 2016 with all sites showing a significant increase in wind speeds by 1000 PST coincident with elevated concentrations of PM_{10}. The graphs help illustrate the regional extent of the high wind event. Individual wind station graphs are located in **Appendix B**.

The resulting entrained dust and accompanying high winds from the system qualify this event as a “high wind dust event”.[7] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the March 6, 2016 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

FIGURE 2-22
72 HOUR WIND SPEEDS REGIONAL SITES

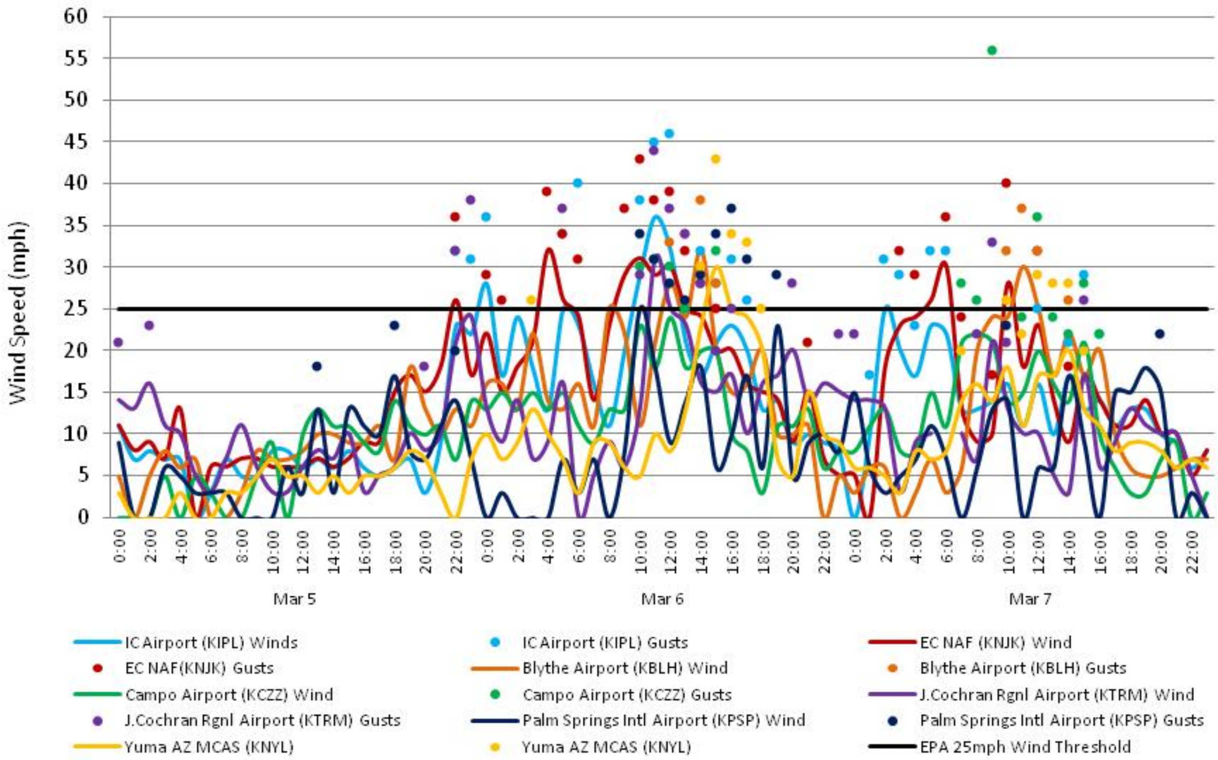


Fig 2-22: The graph illustrates the regional effect of the high winds. All sites measure increased wind speeds within hours of each other. The highest increases start around 1000 PST. Imperial County Airport and El Centro NAF measured winds above the 25 mph threshold. Wind Data from the NCEI’s QCLCD system

[7] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-23
72 HOUR PM_{10} CONCENTRATIONS AT VARIOUS SITES

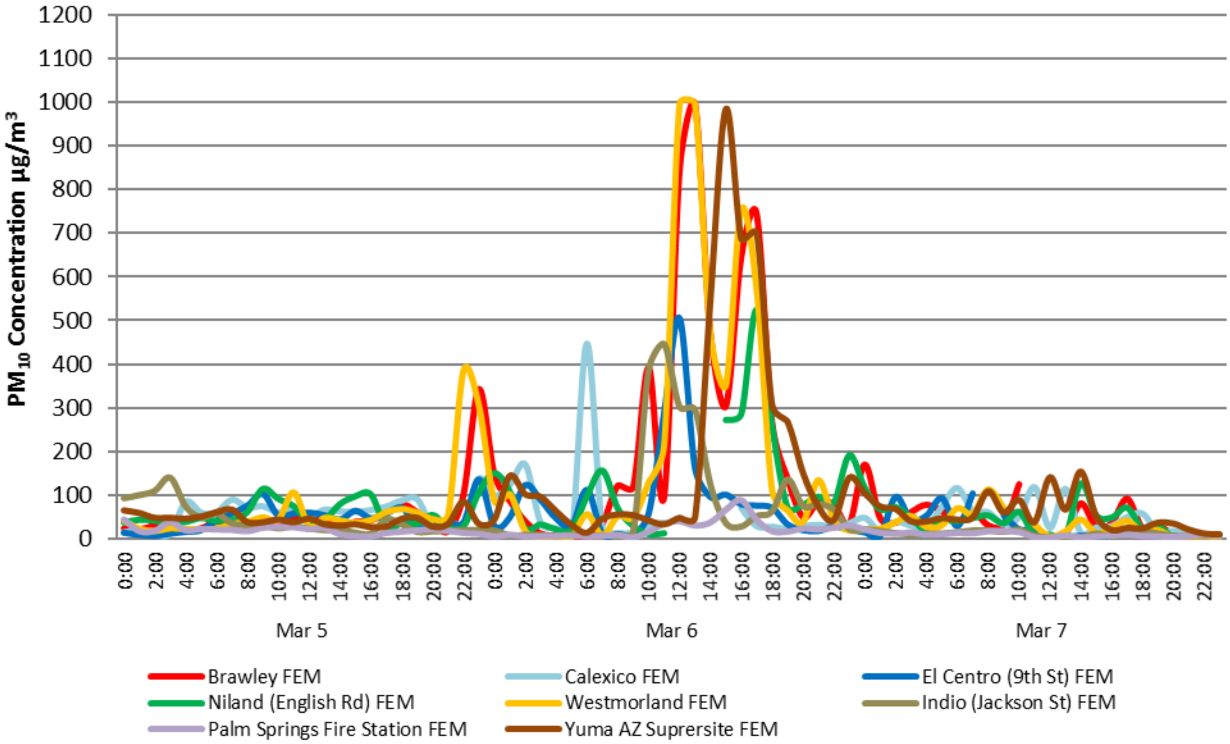


Fig 2-23: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various sites in California and Arizona. The elevated PM_{10} concentrations at all sites on March 6, 2016, demonstrate the regional effect of the weather system and accompanying winds. Air quality data from the EPA's AQS data bank

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley and Westmorland monitors on March 6, 2016, compared to non-event and event days demonstrating the variability over several years and seasons. The analysis, also, provides supporting evidence that there exists a clear causal relationship between the March 6, 2016 high wind event and the exceedance measured at the Brawley and Westmorland monitors.

Figures 3-1 through 3-4 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley and Westmorland monitors for the period of January 1, 2010 through March 6, 2016. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.[8] Properly establishing the variability of the event as it occurred on March 6, 2016, 24-hour averaged PM_{10} concentrations between January 1, 2010 and March 6, 2016 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on March 6, 2016, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[8] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MARCH 6, 2016

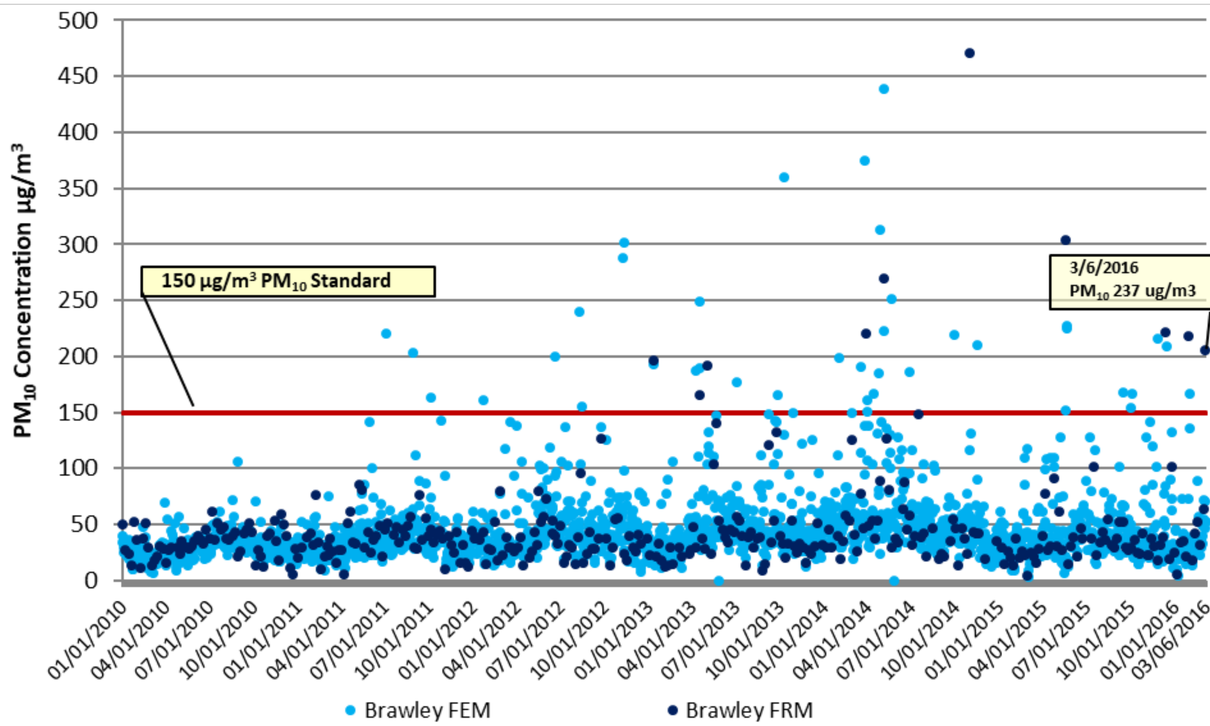


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 237 µg/m³ by the Brawley monitor was outside the normal historical concentrations when compared to event days and non-event days

FIGURE 3-2
WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MARCH 6, 2016

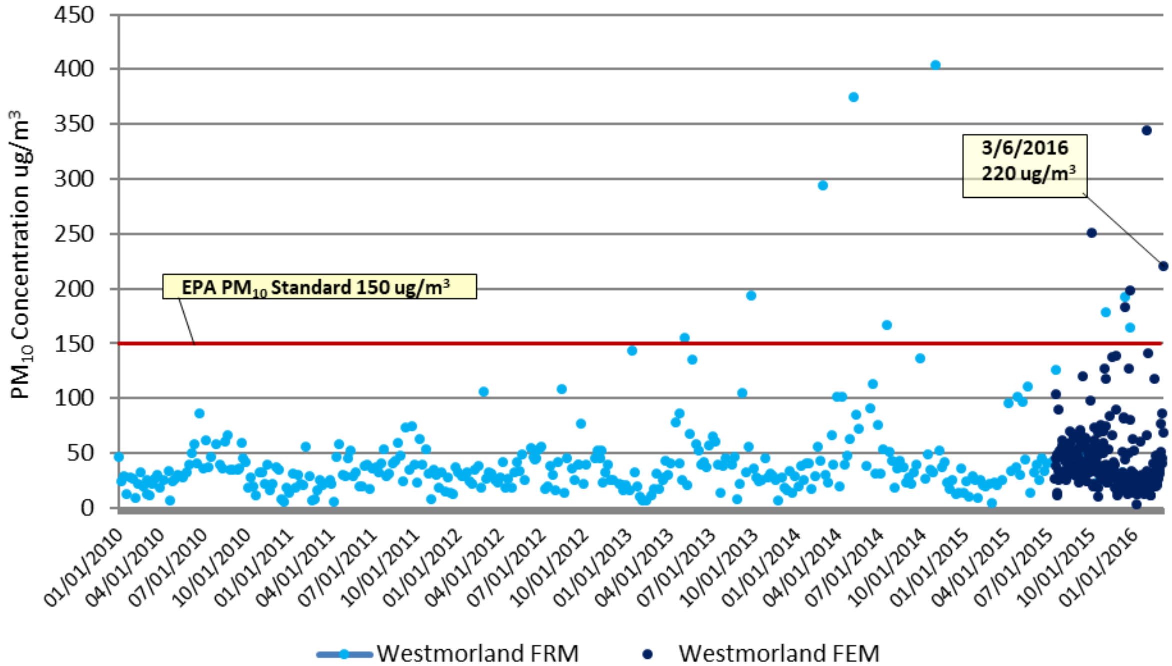
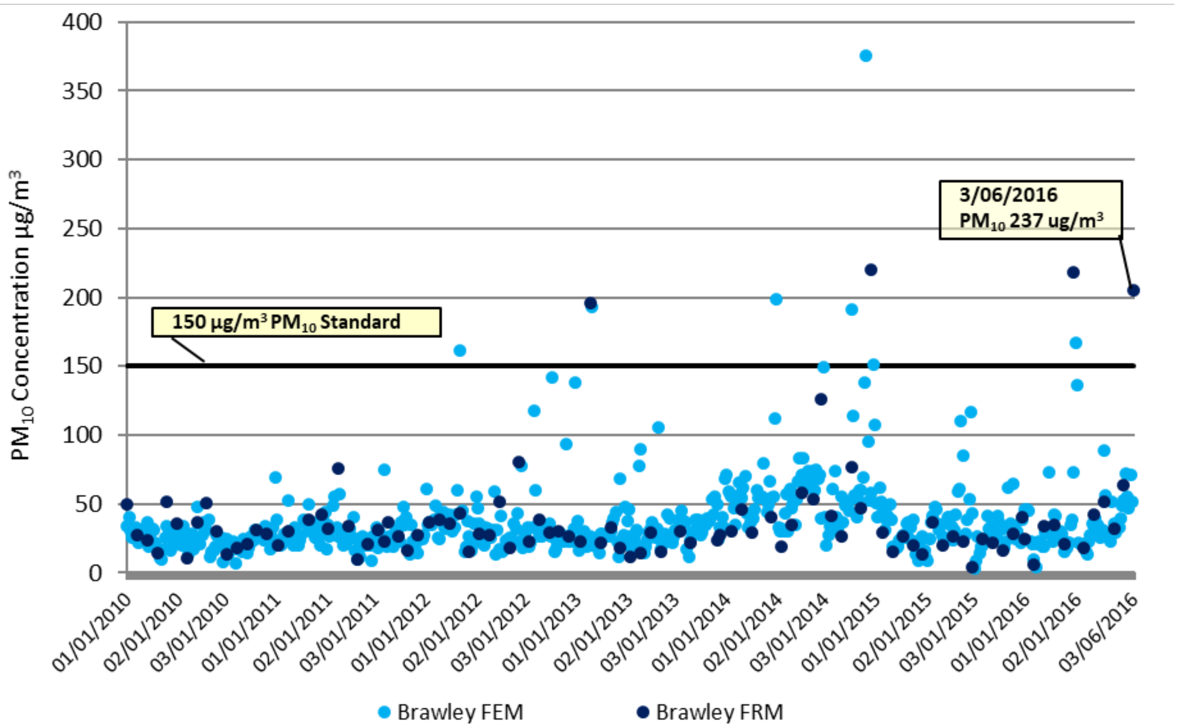


Fig 3-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 220 µg/m³ by the Westmorland monitor was outside the normal historical concentrations when compared to event days and non-event days

The time series, **Figures 3-1 through 3-2** for Brawley included 2,614 credible samples and for Westmorland 593 credible samples measured between January 1, 2010 and March 6, 2016 or 2,257 sampling days for Brawley and 573 sampling days for Westmorland.

Overall, the time series illustrates that the Brawley monitor, measured 41 exceedance days out of the 2,257 sampling days, which is less than a 2.0% occurrence rate. Westmorland measured 12 exceedance days out of 573 sampling days, which is less than a 2.5% occurrence rate. Of the total combined 46 exceedance days, 10 exceedance days occurred during the first quarter (January – March). The remaining 36 exceedance days occurred during the second, third and fourth quarters. The March 6, 2016 concentration is outside the normal historical measurements for the first quarter. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.

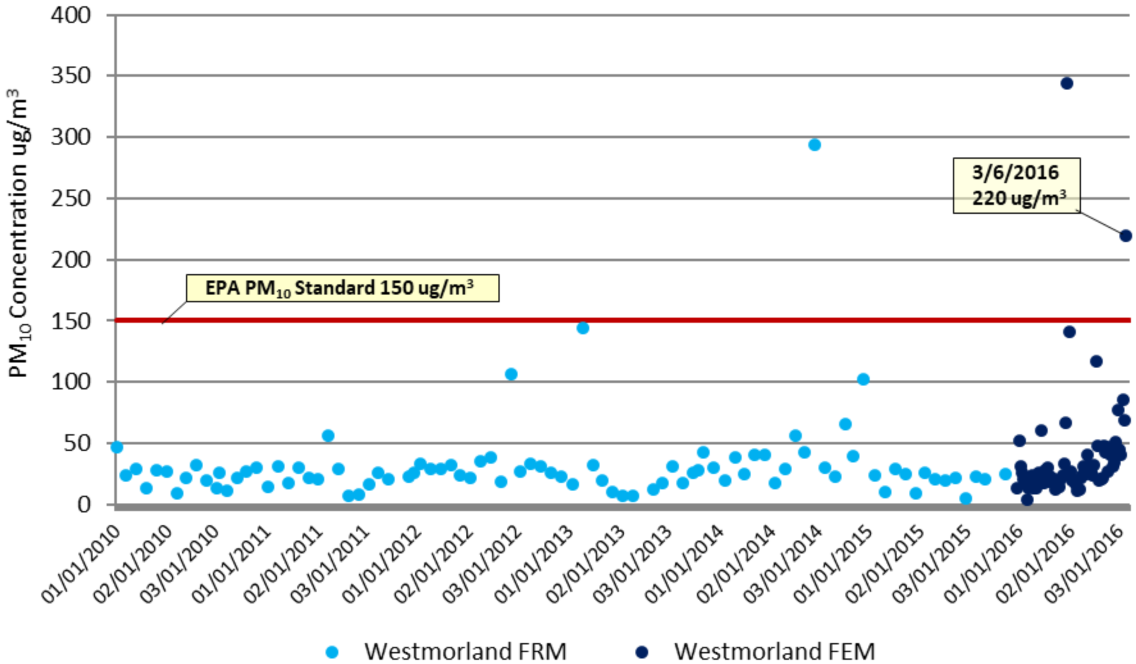
FIGURE 3-3
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
***JANUARY 1, 2010 TO MARCH 30, 2016**



***Quarterly: January 1, 2010 to March 31, 2015 and March 1, 2016 to March 6, 2016**

Fig 3-3: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentration of 237 µg/m³ by the Brawley monitor on March 6, 2016 was outside the normal seasonal concentrations when compared to event days and non-event days

FIGURE 3-4
WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
***JANUARY 1, 2010 TO MARCH 30, 2016**



***Quarterly: January 1, 2010 to March 31, 2015 and March 1, 2016 to March 6, 2016**

Fig 3-4: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentration of 220 µg/m^3 by the Westmorland monitor on March 6, 2016 was outside the normal seasonal concentrations when compared to event days and non-event days

Figures 3-3 through 3-4 displays the seasonal fluctuation over a combined quarterly review of 607 sampling days at the Brawley and Westmorland monitors for first quarter (January - March) between 2010 and 2016. Combined the Brawley and Westmorland monitors measured 860 credible samples over 607 sampling days. Of the 607 sampling days, there were 10 measured exceedance days, which equates to less than a 2.0% occurrence rate. The March 6, 2016 measured concentrations at the Brawley and Westmorland monitors were outside the normal historical and seasonal concentrations when compared to both event days and non-event days.

FIGURE 3-5
BRAWLEY HISTORICAL
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MARCH 6, 2016

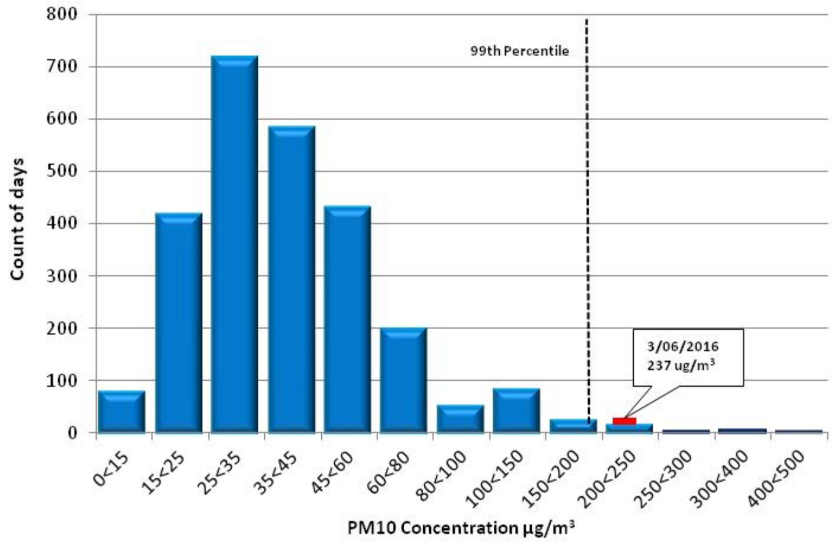


Fig 3-5: The 24-hr average PM_{10} concentration at the Brawley monitoring site demonstrates that the concentration of 237 µg/m^3 falls above the 99th percentile

FIGURE 3-6
WESTMORLAND HISTORICAL
FRM AND FEM PM_{10} 24 HOUR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MARCH 6, 2016

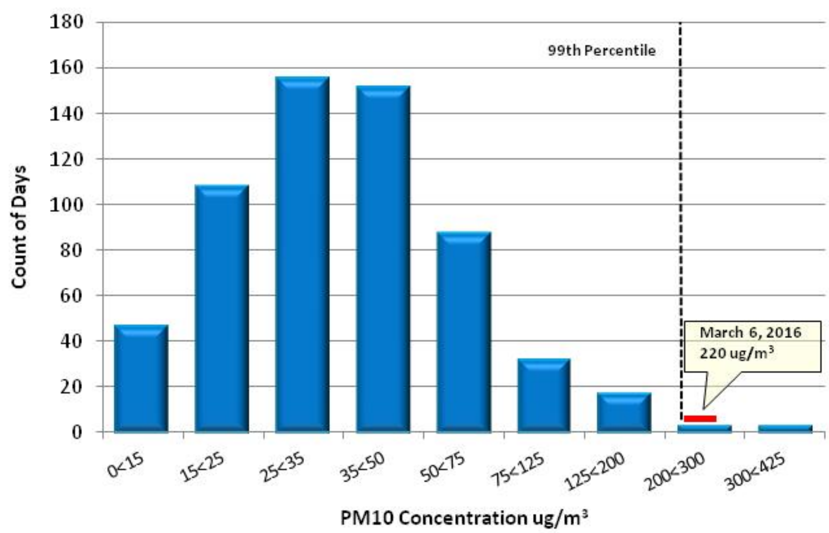


Fig 3-6: The 24-hr average PM_{10} concentration at the Westmorland monitoring site demonstrates that the concentration of 220 µg/m^3 was in excess of the 99th percentile

For the combined FRM and FEM data sets for the Brawley and Westmorland monitors the annual historical and the seasonal historical PM_{10} concentration of 237 µg/m^3 and 220 µg/m^3 both are above the 99th percentile rank. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the March 6, 2016 measured exceedance is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on March 6, 2016 occurs infrequently. When comparing the measured PM_{10} levels on March 6, 2016 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Brawley and Westmorland monitors were outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the March 6, 2016 natural event affected the concentrations levels at the Brawley and Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on March 6, 2016 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. To address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures to consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for March 6, 2016. In addition, this March 6, 2016 demonstration provides technical and non-technical evidence that strong and gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley and Westmorland monitors on March 6, 2016. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the March 6, 2016 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute, which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006, ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

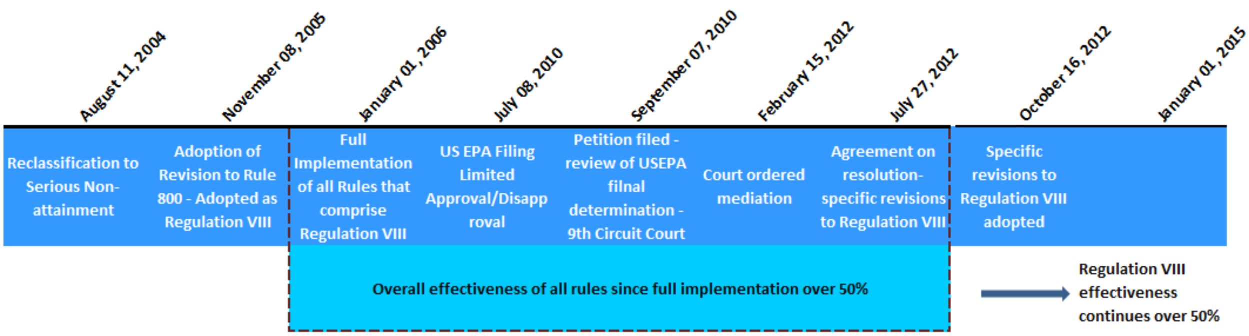


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires landowners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempt.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempt.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;

- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California, which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required, under the Good Neighbor Policy, to notice and advise members of the public of a potential burn. On March 11, 2016, declared a No Burn day, the ICAPCD did not receive any complaints regarding agricultural or waste burning.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Westmorland and Brawley during the March 6, 2016 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on March 6, 2016, officially declared a "NO" burn day, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

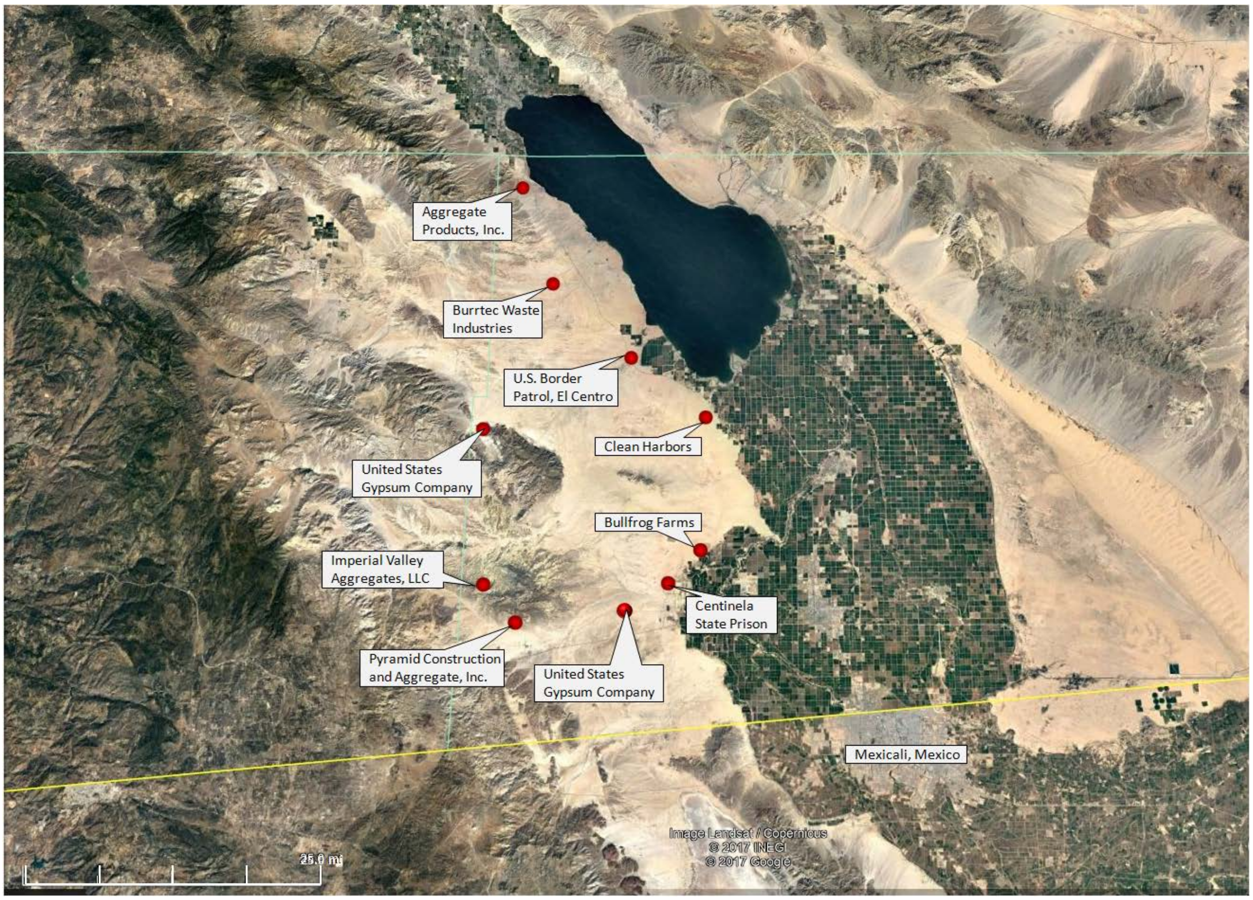


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

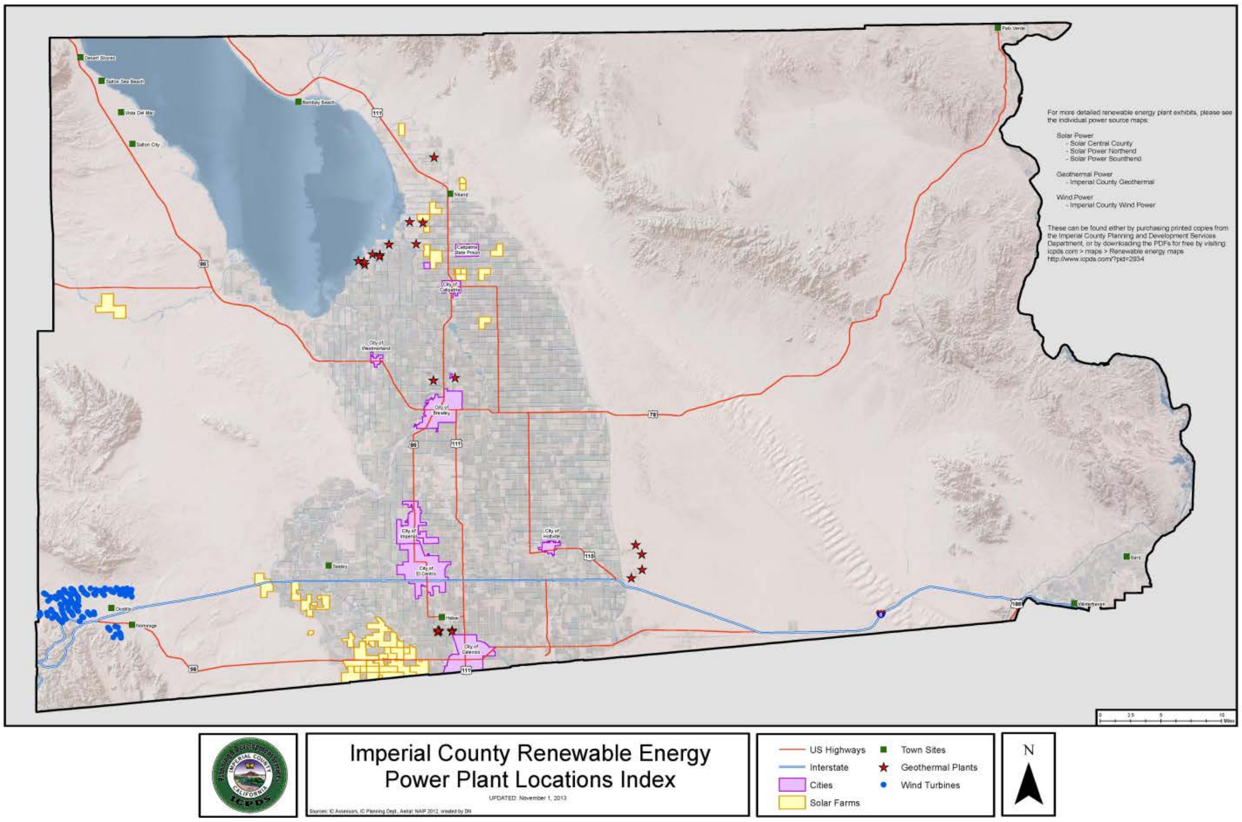


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

The NWS office issued wind advisories and Blowing Dust advisories for Imperial County. In addition, the NWS office issued wind advisories for the San Bernardino County Mountains, the Riverside County mountains, the Coachella Valley, and the San Diego County Mountains and deserts that were immediately upstream of Imperial County. (**Appendix A Supplemental**)

The ICAPCD and the NWS provided an extended week to weekend notification via the ICAPCD's webpage on March 5, 2016 that a cold front would pass through the region by Sunday, March 6, 2016. The San Diego and Phoenix NWS weather stories and the ICAPCD web notification advised of the possibility of strong and gusty winds through the mountains and desert regions through the weekend, with the potential for elevated particulate matter due to blowing dust.

IV.3 Wind Observations

Wind data during the event collected from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County. Data were also collected from automated meteorological instruments that were upstream from the Brawley monitoring station during the wind event. Imperial County Airport (KIPL) experienced five hours of winds at or above the 25 mph threshold. El Centro NAF (KNJK) reported seven hours of winds at or above the 25 mph threshold. Mountain Springs Grade (MesoWest Station ID TNSC1) had nine hours of winds at or above the 25 mph threshold. Sunrise-Ocotillo (MesoWest Station ID IMPSD) had two hours of winds at or above the 25 mph threshold. Wind speeds of 25 mph are normally sufficient to overcome most PM_{10} control measures. During the March 6, 2016 event, wind speeds were above the 25-mph threshold, overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that gusty high winds accompanying a strong cold front that moved through southern California transported windblown dust that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements at or upstream of the Brawley and Westmorland monitors during the event were high enough (at or above 25 mph, with wind gusts of 46 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be a natural event, even when portions of the wind-driven emissions are anthropogenic. However, the anthropogenic emissions must have a clear causal relationship to the event and could not be reasonably controlled or preventable. This demonstration has shown that the event that occurred on March 6, 2016 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The March 6, 2016 event can be an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for March 6, 2016, identified a strong Pacific low-pressure system with associated gusty high winds that moved through the region. The strengthening of the low led to a tightening of the surface gradient from the southern California coastline to southern Nevada. This created strong onshore winds across southern and southeastern California. **Figure 5-1** shows the gradient differed from 1016mb near the California coast to 1004 near the CA-NV border. This fueled an intense onshore flow over southeastern California and Imperial County and led to the high winds that blowing dust in Imperial County shown in **Figure 5-2** and **Figure 5-3.**

FIGURE 5-1
PACKED GRADIENTS ACROSS SOUTHEASTERN CALIFORNIA

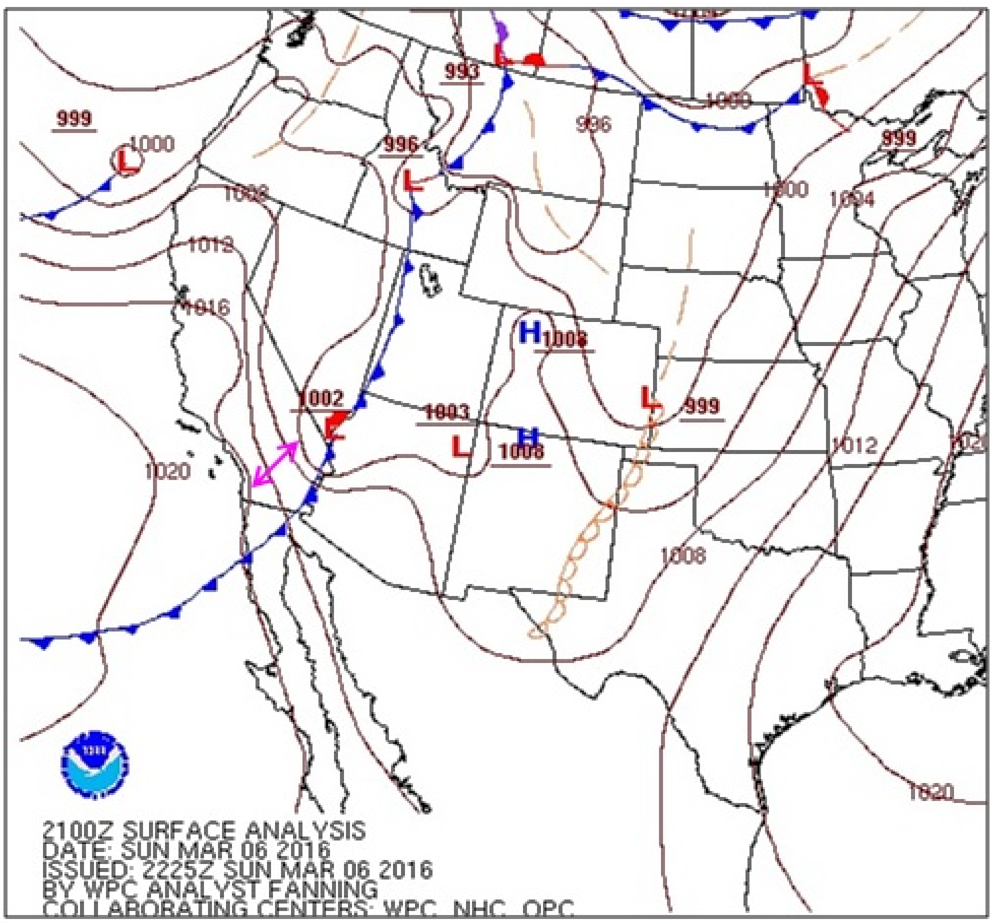


Fig 5-1: A difference of about 12mb between the southern California coast and the CA-NV border promoted the development of high winds over the region on March 6, 2016. Source: Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php

FIGURE 5-2
STRONG SURFACE WINDS ACROSS SOUTHEASTERN CALIFORNIA

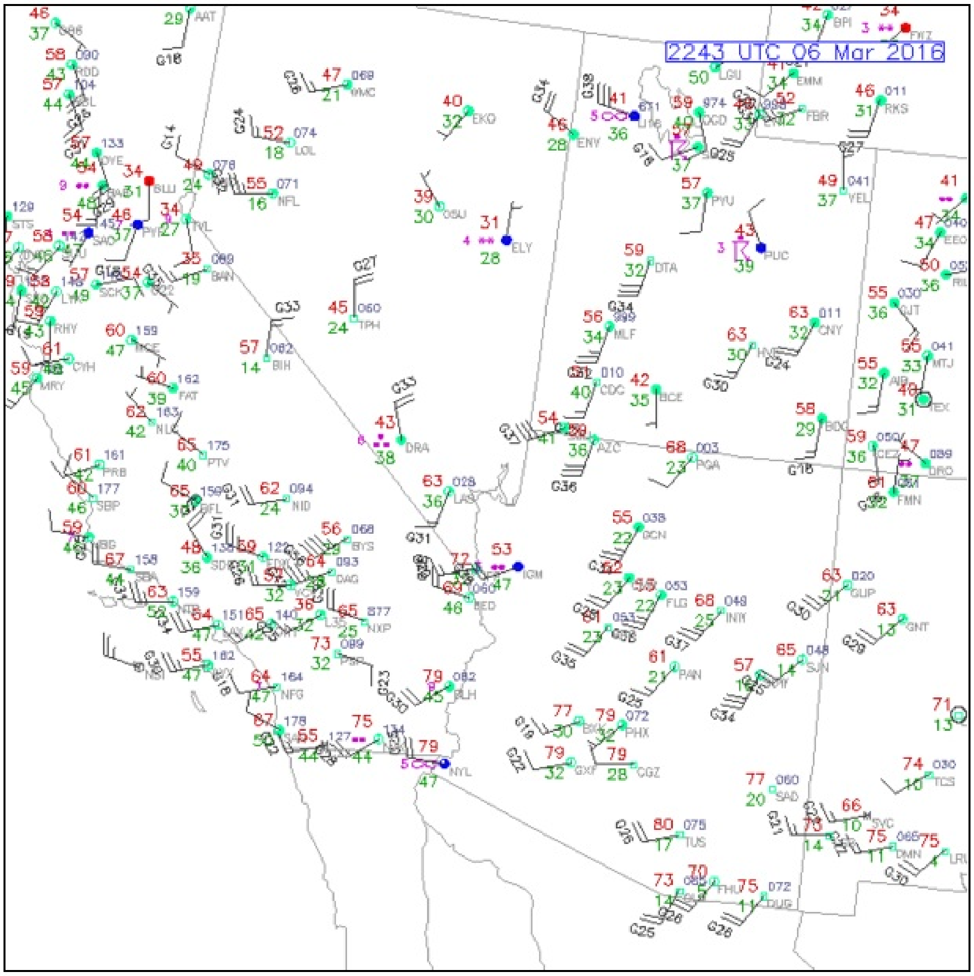


Fig 5-2: A surface wind map with wind barbs depicting southwesterly winds of 23-25 mph over southeastern California at 1443 PST, near the period of strong winds at local airports. Source: http://weather.rap.ucar.edu

Wind advisories[9] were issued for Imperial County and for the San Bernardino County mountains, the Riverside County mountains, the Coachella Valley, the San Diego County mountains, deserts, and areas of southwestern Arizona. Blowing dust advisories[10] were issued for Imperial County and portions of southwestern Arizona. **Figure 5-3** helps visualize the regional extent of the wind event.

[9] A wind advisory is issued when the following conditions are met for one (1) hour or longer: 1) sustained winds of 31 to 39 mph, and/or; 2) wind gusts of 46 to 57 mph for any duration. Source: NWS, 2016, [http://www.weather.gov/lwx/WarningsDefined#Wind Advisory](http://www.weather.gov/lwx/WarningsDefined#Wind%20Advisory)

[10] A Blowing Dust Advisory is issued when blowing dust is expected to reduce visibility to between 1/4 and 1 mile, generally with winds of 25 mph or greater. https://www.weather.gov/oun/spotter-wwa-definitions

FIGURE 5-3
REGIONAL WIND AND BLOWING DUST ADVISORIES

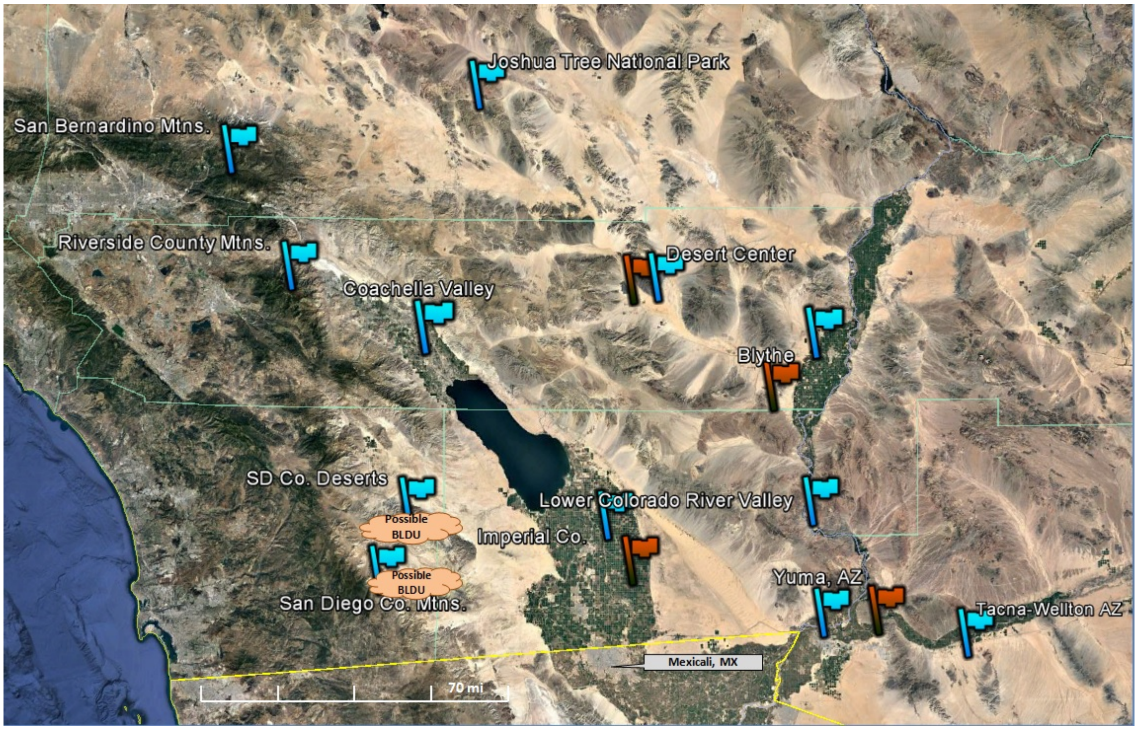


Fig 5-3: Regional gusty high winds affected Imperial, Riverside, San Diego and Yuma counties on March 6, 2016. Wind advisories (blue flags) were issued for areas both west, north and east of Imperial County. Both wind and blowing dust (brown flags) advisories were issued for Imperial County. Notices collected from the NWS and the Iowa Environmental Mesonet. Yellow line is the international boundary. Aqua lines indicate counties. Base map from Google Earth

To help support the effect of the gusty high westerly winds upon the region, a Smoke Text Product issued by NOAA's Satellite Services Division on March 6, 2016 identified blowing dust, created by strong gusty winds, over southeastern California. **Figure 5-4** is an Aqua MODIS satellite image of a thin but noticeable layer of dust spreading over the northern portion of Imperial County. **Appendix A** contains copies of notices pertinent to the March 6, 2016 event.

FIGURE 5-4
SUSPENDED DUST OVER IMPERIAL COUNTY

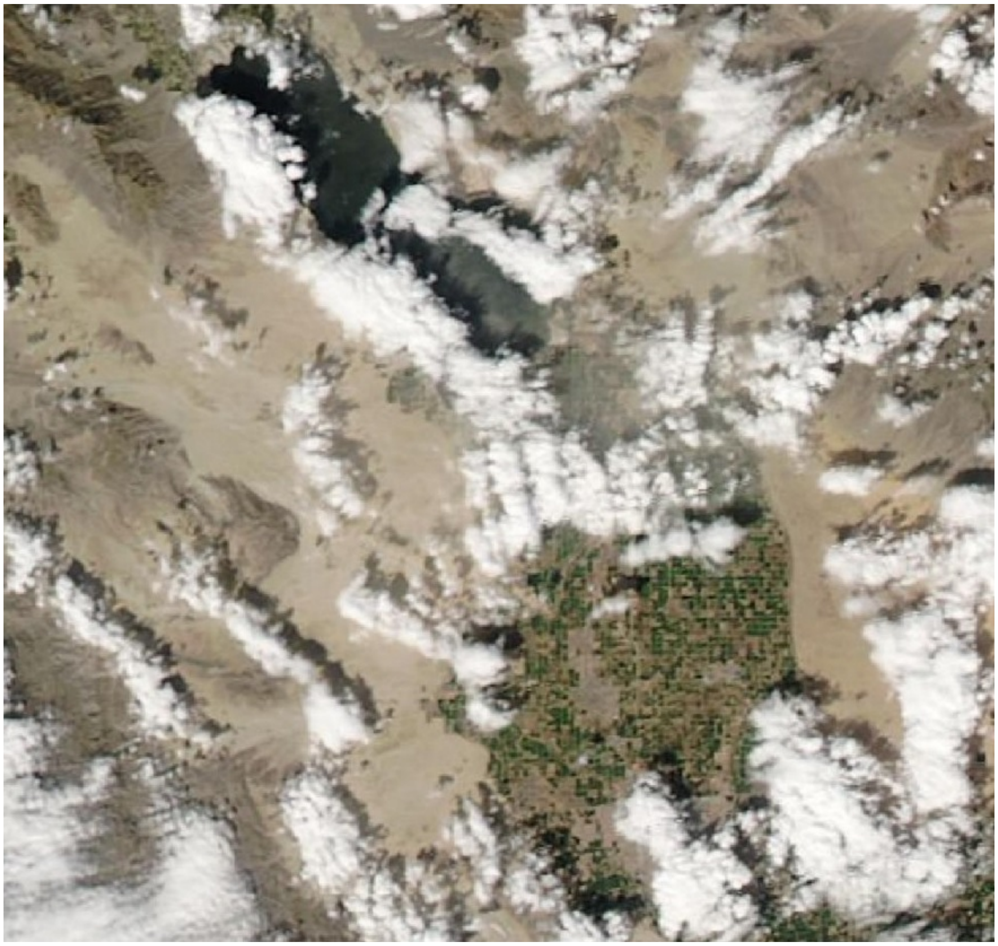


Fig 5-4: A MODIS instrument onboard the Aqua satellite (1330 PST) captured a thin but noticeable layer of dust over the northern end of the Imperial Valley and the southern portion of the Salton Sea. Source: MODIS Today. http://ge.ssec.wisc.edu/modis-today

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[11] **Tables 5-1 through 5-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the exceeding monitors.[12] Although the Brawley station does not measure wind speed or direction, as does Westmorland, the tables below show that the Brawley monitor measured peak hourly concentrations either following or during the period of high upstream wind speeds. As the gusty high winds blew over and through the mountains of San Diego County before moving down the canyon/desert slopes and through the passes on Interstate 8 the meteorological measurements by the Mountain Springs Grade meteorological station were used to help capture the significance of the gusty high winds. As the

[11] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

[12] Not all meteorological sites measure (sample) at the same heights or with the same instruments. For additional information regarding the monitor please refer to the indicated source of the information described below each table.

winds blew through the mountains this helped funnel the winds toward Brawley and Westmorland.

TABLE 5-1

WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY MARCH 6, 2016

	Imperial County Airport (KIPL)			El Centro NAF (KNJK)			Mountain Springs Grade			Sunrise-Ocotillo			Brawley
HOUR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	PM_{10} (µg/m³)
000	28	36	250	22	29	250	16	30	230	7	13	272	146
100	17		250	15	26	260	17	31	229	9	15	272	86
200	24		250	18		260	21	33	240	8	17	265	39
300	18		230	21		250	21	33	227	12	20	260	11
400	13		270	32	39	250	19	36	224	11	18	252	6
500	25	34	260	26	34	260	19	39	239	13	25	267	1
600	23	40	250	24	31	240	21	37	228	12	23	250	4
700	16		200	14		230	20	36	222	11	19	254	34
800	11		250	23		240	22	36	218	12	18	245	121
900	20		230	29	37	230	24	37	206	5	12	253	118
1000	29	38	250	31	43	260	24	47	221	6	12	296	391
1100	36	45	250	29	38	250	27	39	238	12	19	275	96
1200	32	46	240	30	39	230	22	41	255	20	30	282	843
1300	21	25	250	25	32	240	31	47	241	15	32	277	995
1400	17	32	250	24	28	280	23	45	248	17	40	281	470
1500	21	28	270	20	25	300	33	51	239	18	33	265	303
1600	23	31	300	20		280	32	48	234	15	29	266	646
1700	20	26	300	16		280	31	48	234	11	18	252	743
1800	13		260	15		270	28	45	197	10	14	238	264
1900	14		260	14		260	31	44	207	11	19	253	137
2000	9		260	9		270	29	46	227	10	17	249	49
2100	10		270	15	21	260	24	47	233	13	25	256	84
2200	9		260	7		280	32	44	233	19	29	255	77
2300	8		260	5		250	25	45	236	15	31	256	34

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Sunrise Ocotillo (IMPSD) and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Brawley station does not measure wind data. Wind speeds = mph; Direction = degrees

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR WESTMORLAND MARCH 6, 2016

	Imperial County Airport (KIPL)			El Centro NAF (KNJK)			Sunrise-Ocotillo			Westmorland		Westmorland
HOUR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/D	PM_{10} (µg/m³)
000	28	36	250	22	29	250	7	13	272	7.2	243	87
100	17		250	15	26	260	9	15	272	5.3	244	103
200	24		250	18		260	8	17	265	5.7	233	19
300	18		230	21		250	12	20	260	5.6	226	5
400	13		270	32	39	250	11	18	252	4.3	216	5
500	25	34	260	26	34	260	13	25	267	5	231	5
600	23	40	250	24	31	240	12	23	250	5.3	218	57
700	16		200	14		230	11	19	254	5.4	205	9
800	11		250	23		240	12	18	245	8.4	223	53
900	20		230	29	37	230	5	12	253	9.1	224	50
1000	29	38	250	31	43	260	6	12	296	7	252	130
1100	36	45	250	29	38	250	12	19	275	8.6	245	213
1200	32	46	240	30	39	230	20	30	282	12.8	292	995
1300	21	25	250	25	32	240	15	32	277	21.9	286	995
1400	17	32	250	24	28	280	17	40	281	21.1	287	470
1500	21	28	270	20	25	300	18	33	265	17.1	280	352
1600	23	31	300	20		280	15	29	266	18.4	276	754
1700	20	26	300	16		280	11	18	252	18.3	279	571
1800	13		260	15		270	10	14	238	15.5	280	111
1900	14		260	14		260	11	19	253	14.5	283	66
2000	9		260	9		270	10	17	249	14.2	282	39
2100	10		270	15	21	260	13	25	256	12.4	283	135
2200	9		260	7		280	19	29	255	13.9	286	45
2300	8		260	5		250	15	31	256	12.2	289	20

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Westmorland does not measure gusts. Wind data for Sunrise Ocotillo (IMPSD) from the University of Utah's MesoWest system. Wind and air quality data for Westmorland from the EPA's AQS data bank. Wind speeds = mph; Direction = degrees

Figure 5-5 graphically depicts the timeline associated with the exceedance at the Brawley and Westmorland monitors. Both duration and velocity played a critical role in the exceedance at the Brawley and Westmorland monitors. Mountain Springs Grade (MesoWest Station ID TNSC1) measured nine hours of winds at or above the 25-mph threshold. From 0050 PST through 2350 PST the station measured gusts at or above 30 mph. Sunrise-Ocotillo (MesoWest Station ID IMPSD) measured two hours of winds at or above the 25-mph threshold, with nine hours of gusts at or above 25 mph. Closer to Brawley and Westmorland, both Imperial County Airport (KIPL) measured five hours of winds at or above the 25-mph threshold. El Centro NAF (KNJK) measured seven hours of winds at or above the 25-mph threshold. Strong winds blew through the San Diego County Mountains funneled down desert slopes and swept across the desert floor. Transported windblown dust from the western edge of the Sonoran Desert blew into the Imperial County affecting air quality and causing an exceedance.

FIGURE 5-5
EXCEEDANCE TIMELINE

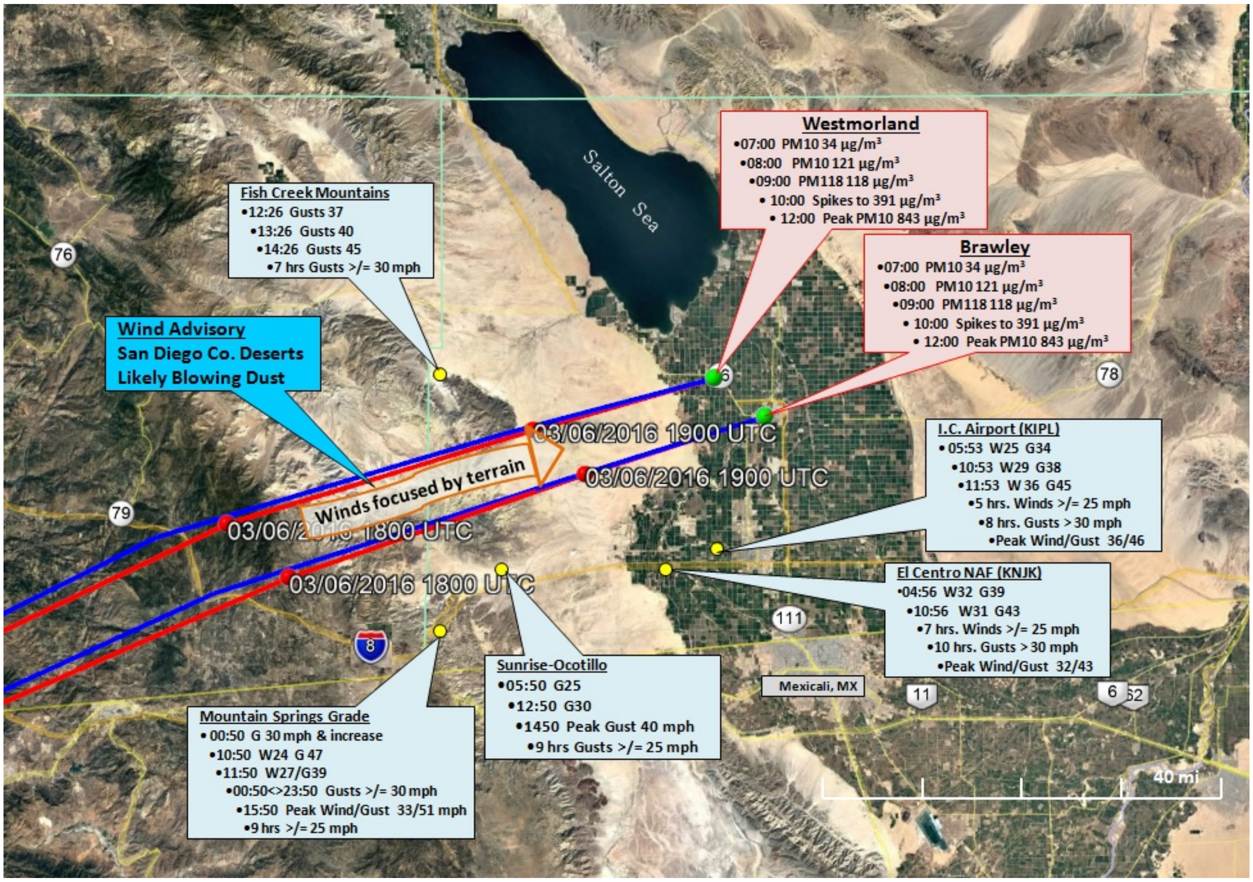


Fig 5-5: Gusty high winds blowing over and through the San Diego County Mountains, down desert slopes, over natural open desert areas transported windblown dust in Imperial County. The 12-hour HYSPLIT back-trajectory illustrates the path of air flowing towards the Westmorland and Brawley monitors ending at 1200 PST/2000 UTC coincident with the measure peak concentration at the Westmorland monitor and an hour before Brawley measured a similar peak hourly concentration. Red trajectory is airflow at the 10m level; blue is 100m. Aqua lines depict county borders. Generated through NOAA's Air Resources Laboratory. Base map from Google Earth

Figures 5-6 through 5-8 depict elevated levels of PM_{10} concentrations, elevated wind speeds and gust at the Brawley and Westmorland monitors, March 5, 2016 through March 7, 2016. A correlation between elevated wind speeds and concentrations is evident. As winds increased on March 5, 2016, elevated concentrations of PM_{10} were measured at the Brawley monitor around 2200 PST March 5, 2016 through 0100 PST March 6, 2016. Shortly after, concentrations fell as winds at KIPL (the nearest of the two airports to Brawley) reduced. By 1000 PST, winds increased coincident with an increase in concentrations as windblown dust reached the Brawley monitor.

Figure 5-8 depicts the relationship between the Westmorland and Brawley concentrations and upstream wind speeds over a 72-hour period. An increase in winds late on March 5, 2016 caused a spike in concentrations early on March 6, 2016. Concentrations subsided as winds dipped briefly (with the exception of KIPL). As winds increased mid-morning concentrations likewise rose. **Appendix C** contains additional graphs illustrating the relationship between PM_{10} concentrations and wind speeds from region monitoring sites within Imperial County, eastern Riverside County, and Yuma, Arizona during the wind event.

FIGURE 5-6
BRAWLEY PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

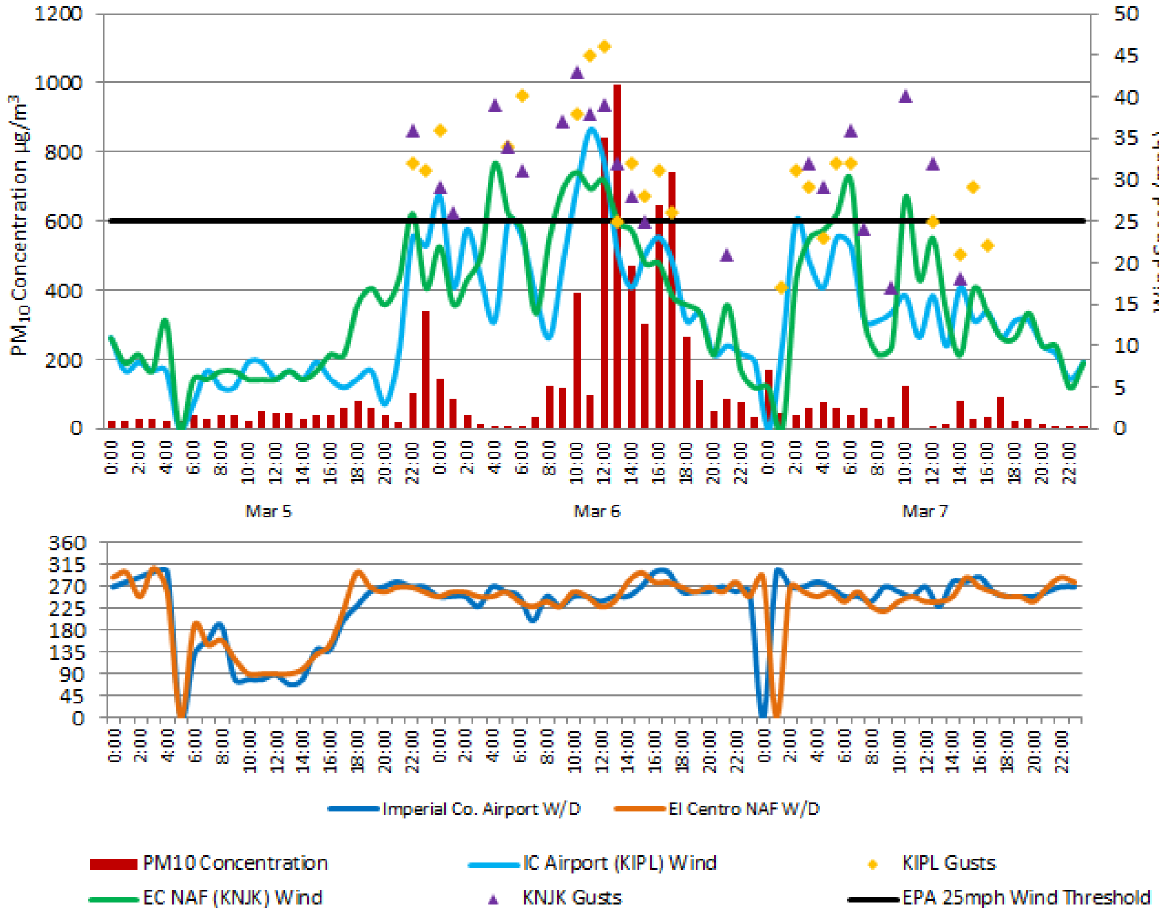


Fig 5-6: Fluctuations in hourly concentrations over 72 hours show a positive correlation with wind speeds, particularly with gusts, at Imperial County Airport (KIPL) and El Centro NAF (KNJKL). The Brawley station does not measure wind. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

FIGURE 5-7
WESTMORLAND PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

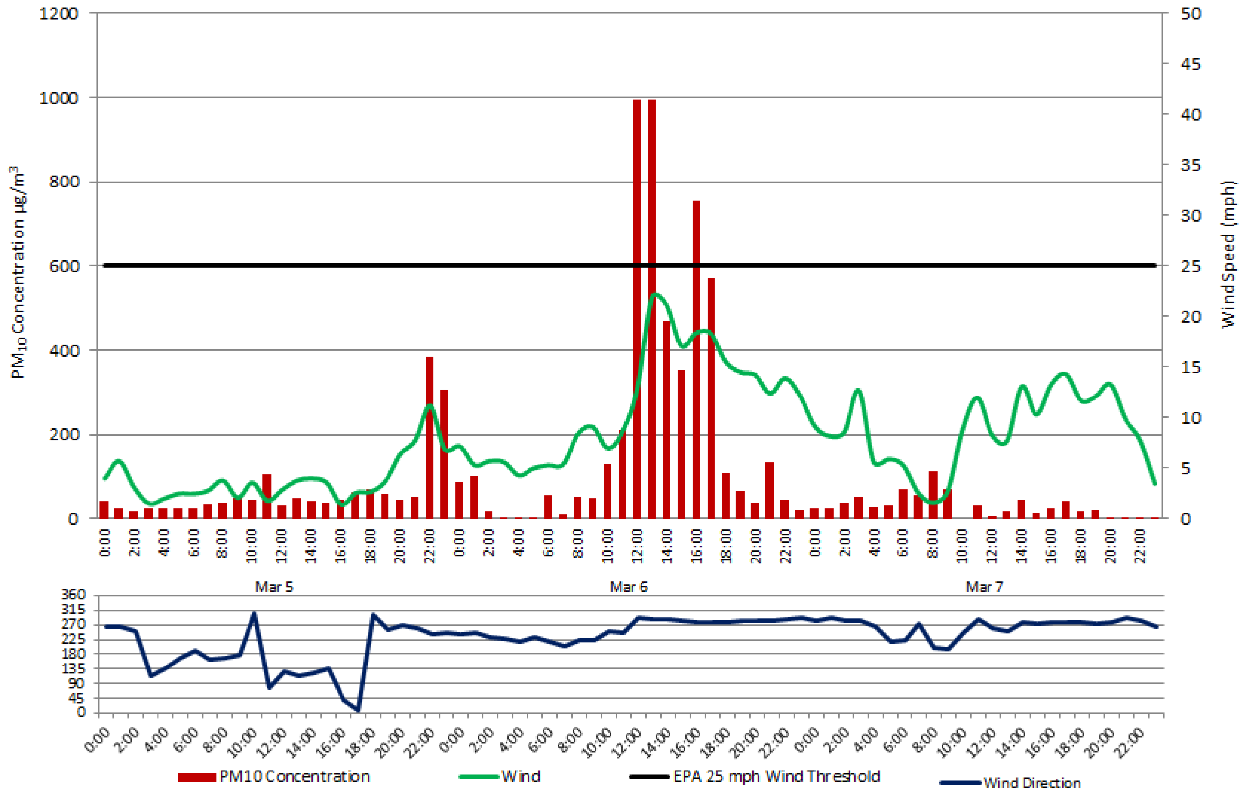


Fig 5-7: Winds at Westmorland measured lower than at Niland and the El Centro NAF and Imperial County Airport. The Westmorland station does not measure gusts an important element for the deposition of dust on the monitor. Gust played an important role in the deposition of windblown dust upon the monitor causing the Westmorland monitor to measure a higher 24-hour average than either the Brawley or Niland monitors. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

Although the Westmorland station (**Figure 5-7**) measured lower wind speeds than at the local airports, gust allowed for greater deposition of dust on the monitor. Unfortunately, none of air monitoring stations in Imperial County measure gusts, however as indicated above elevated measured gusts transported windblown dust into Imperial County allowing for greater deposition of particulates upon the monitors.

FIGURE 5-8
WESTMORLAND AND BRAWLEY PM_{10} CONCENTRATIONS AND UPSTREAM WINDS

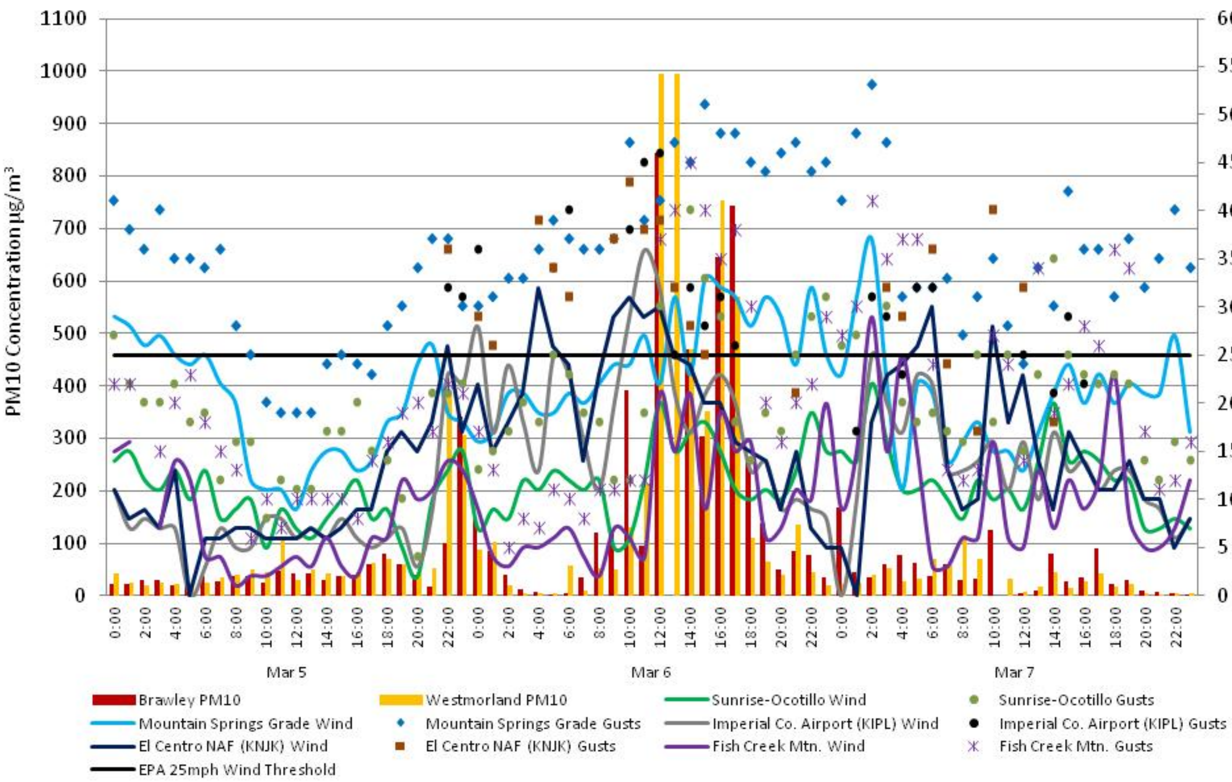


Fig 5-8: Increasing winds and gusts starting around mid-morning led to a subsequent rise in concentrations at the Brawley and Westmorland monitors. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

Figure 5-9 compares the hourly concentrations measured at the Brawley, Westmorland, and Niland monitors May 5, 2016 through May 7, 2016. Although all three monitors measured elevated concentrations of PM_{10} only the Brawley and Westmorland monitors measured an exceedance. The Niland monitor measured 21 hours out of 24 hours averaging 124 µg/m^3. The missing 3 hours, due to a power failure, are coincident with the highest measured hourly concentrations at Westmorland and Brawley. Absent the power failure, more than likely the Niland monitor would have measured an exceedance.

FIGURE 5-9
BRAWLEY, WESTMORLAND AND NILAND 72 HOUR PM_{10} CONCENTRATIONS

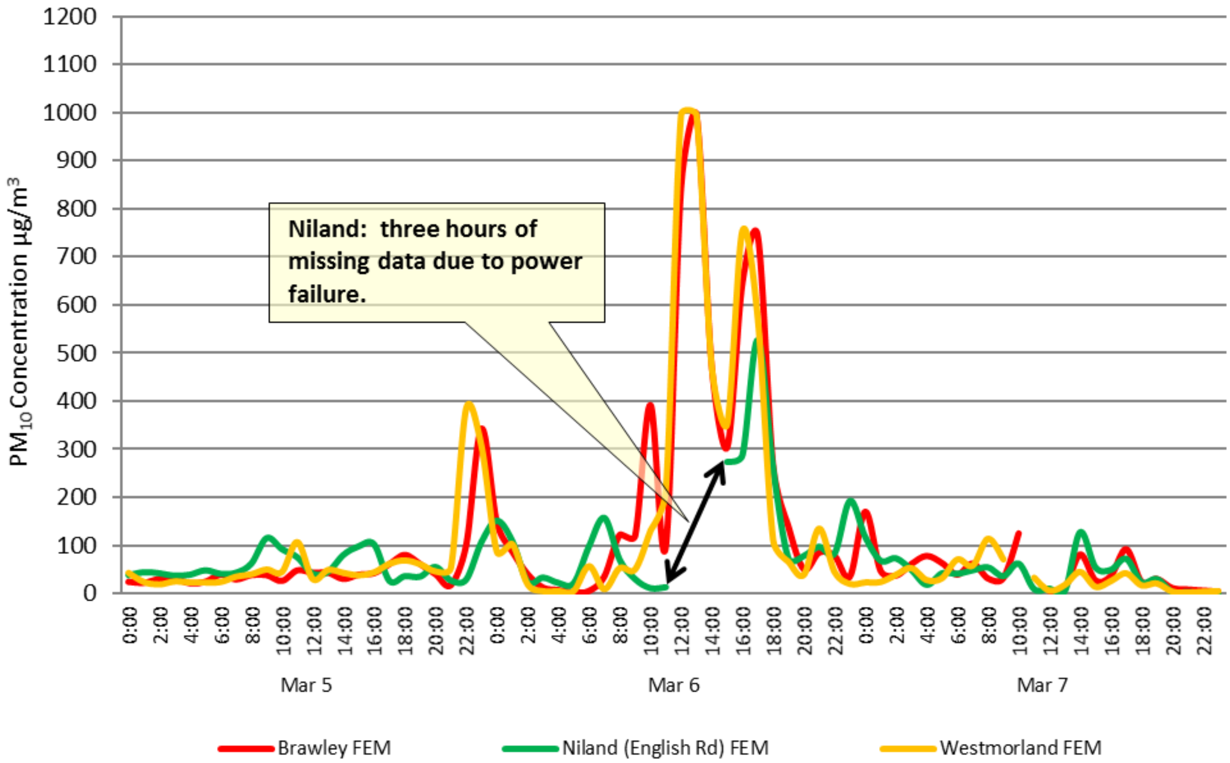


Fig 5-9: Although Niland measured elevated concentrations on March 6, 2016 and because the missing three hours of measured concentrations are coincident with the highest measured hourly concentrations at the Westmorland and Brawley monitors, Niland would have measured an exceedance

Figure 5-10 compares the concentrations at Calexico, El Centro, Brawley, Westmorland, and Niland between March 5, 2016 and March 7, 2016. Visibility[13] at Imperial County Airport (KIPL) reduced severely (~1200) just prior to hourly measured peak concentrations at Brawley and Westmorland. This airport is closest to both Brawley and Westmorland.

[13] According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; http://www.nws.noaa.gov/asos/vsby.htm

FIGURE 5-10
72 HOUR PM_{10} CONCENTRATIONS AND VISIBILITY

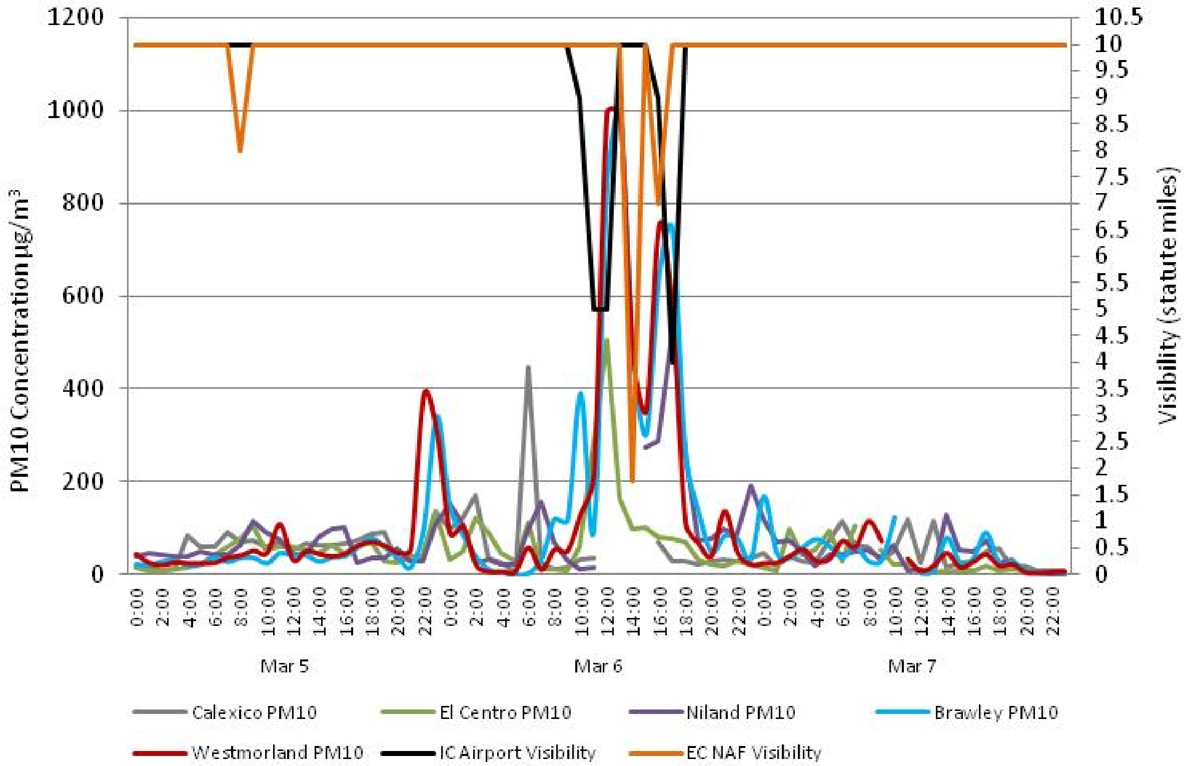


Fig 5-10: Visibility as reported from Imperial County Airport (KIPL) shows that visibility reduced significantly at KIPL prior to measured hourly peak concentrations at Brawley and Westmorland. KIPL is the closer of the two airports to Brawley and Westmorland. Visibility data from the NCEI's QCLCD data bank

Figure 5-11 shows the Air Quality Index[14] (AQI) for Brawley on March 6, 2016. Due to the gusty winds carried over from late on March 5, 2016 Brawley's air quality dropped from "Green" or Good to "Yellow" or Moderate range (PM_{10} 51-100 µg/m^3) at 0200 PST. Air quality remained in the Moderate zone until falling to the "Orange" or Unhealthy for Sensitive Groups level (PM_{10} 101-150 µg/m^3) at 1600 PST. An Air Quality Alert issued at 1400 PST on March 6, 2016 for the Westmorland area, notified the public that air quality was Unhealthy for Sensitive Groups. A useful measurement of the degradation of air quality is the AQI.

FIGURE 5-11

[14] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health .Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: https://airnow.gov/index.cfm?action=aqibasics.aqi

AIR QUALITY INDEX IN BRAWLEY MARCH 6, 2016

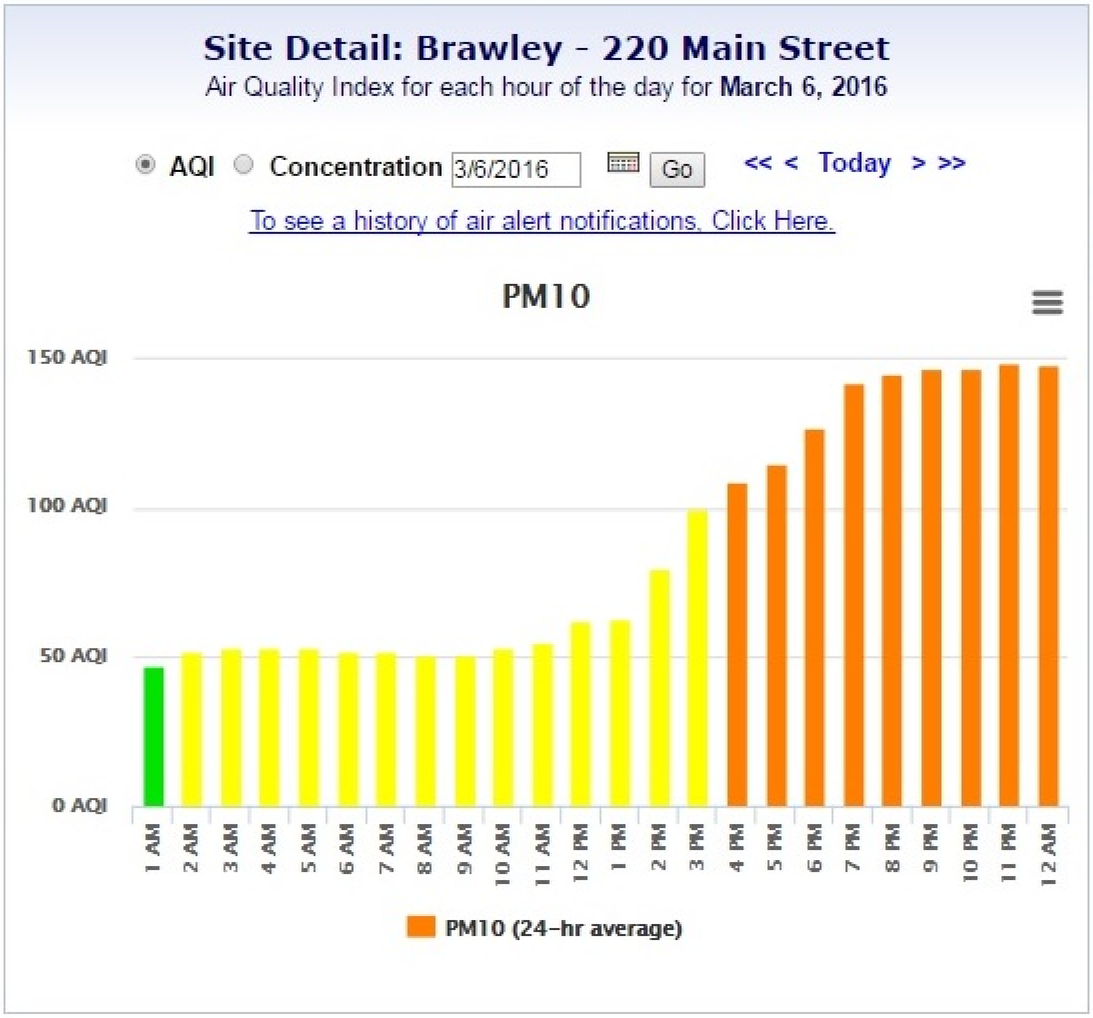


Fig 5-11: Demonstrates that air quality in Imperial County reduced or degraded as high gusty westerly winds associated with a strong Pacific system passed through California on March 6, 2016. Source: ICAPCD archives

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and PM_{10} concentration data illustrating the spatial and temporal effects of the gusty west winds caused by a steep pressure gradient accompanying the low-pressure system that passed through the southern region of California. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Brawley and Westmorland monitors on March 6, 2016. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM_{10} were carried aloft by strong westerly winds into the lower atmosphere causing a change in the air quality conditions within Imperial County. The entrained dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM_{10} concentrations measured on March 6, 2016 coincided with high wind speeds and that gusty west winds were experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-12
MARCH 6, 2016 WIND EVENT TAKEAWAY POINTS

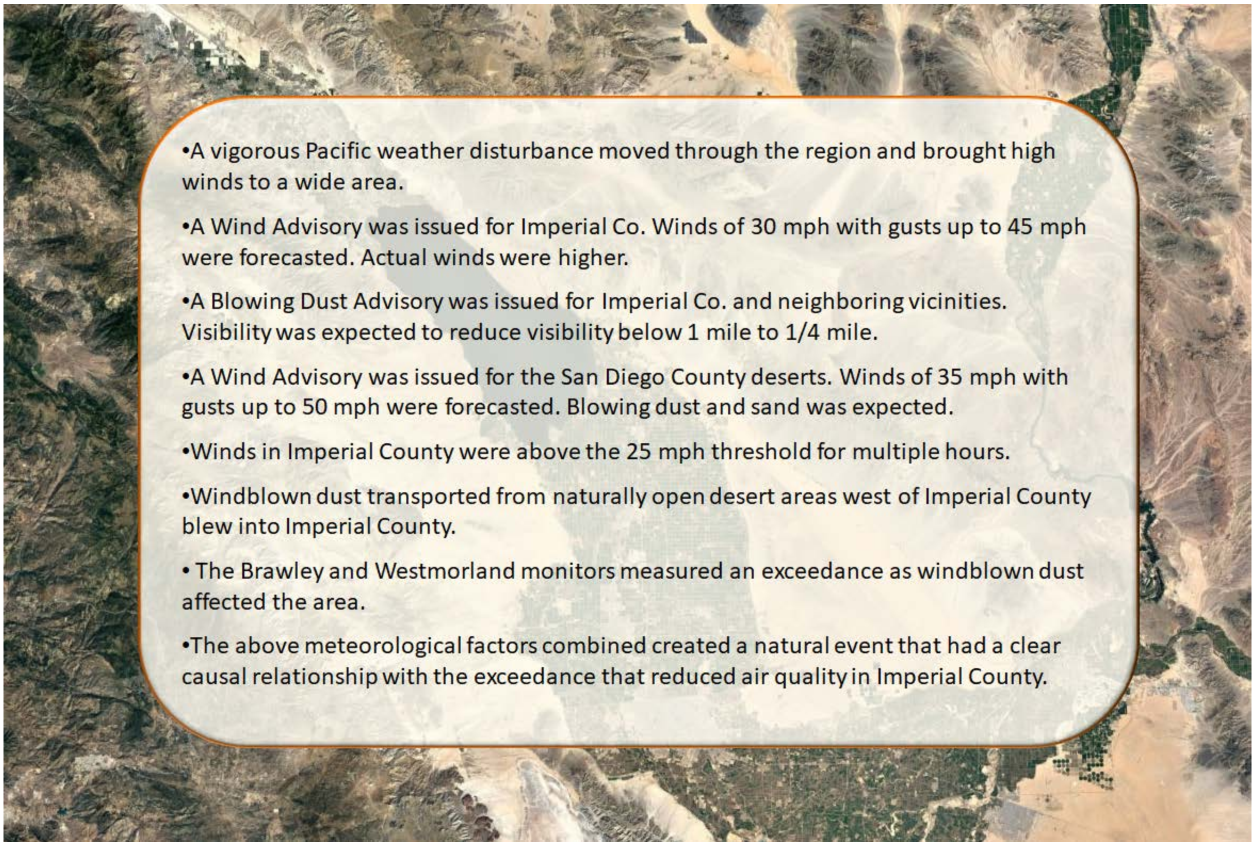


Fig 5-12: Illustrates the factors that qualify the March 6, 2016 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on March 6, 2016, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	5-28
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	43-56; 57
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	29-35; 58
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	36-42; 57
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	43-56; 58

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the March 6, 2016 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be “not reasonably controllable or preventable” (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, strong gusty west winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Brawley and Westmorland monitors caused by naturally occurring strong gusty westerly winds transported windblown dust into Imperial County and other parts of southern California from areas located within the San Diego Mountains. These facts provide strong evidence that the PM_{10} exceedance at the Brawley and Westmorland monitors on March 6, 2016, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50) is an event which may recur at the same location, with its resulting emissions where human activity played little or no direct causal role. Anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions. As discussed within this demonstration, the PM_{10} exceedances that occurred at the Brawley and Westmorland monitors on March 6, 2016, were caused by the transport of fugitive windblown dust into Imperial County by strong gusty westerly winds associated with the passage of low-pressure system and accompanying trough that moved through the region. At the time of the event, anthropogenic sources were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley and Westmorland during different days and the comparative analysis of different monitors in Imperial and Riverside Counties demonstrates a consistency of elevated gusty west winds and concentrations of PM_{10} on March 6, 2016 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty west winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty west winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown fugitive emissions to the exceedances on March 6, 2016.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} values measured at the Brawley and Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains wind advisories issued by the NWS and Imperial County on or around March 6, 2016. In addition, this Appendix contains the air quality alert issued by Imperial County advising sensitive receptors of potentially unhealthy conditions in Imperial County resulting from the strong gusty winds. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County. A

Supplemental Appendix A contains copies of NWS notices pertinent to the March 6, 2016 event.

Appendix B: Meteorological Data

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. Seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.